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ABSTRACT

The proceedings includes the following: "Evaluation of the Leadership Development of Oklahoma Agricultural Leadership Program Graduates" (Lee-Cooper, Weeks); "Model for Undergraduate Academic Programs in Agricultural Communications" (Terry, Jr. et al.); "Competencies Needed for Graduates of Agricultural Communications Programs" (Terry, Bailey-Evans); "Mathematical Problem-Solving Proficiency of Agricultural Education (AE) Teachers in Alabama" (Hunnicutt, Newman); "Learning Styles of AE Pre-Service Teachers" (Raven et al.); "Relationship of Teacher Knowledge and Personal Development of Human Relations Skills in AE" (Foster, Finley); "Roles of Tennessee Extension 4-H Specialists as Perceived by Agents, Specialists, and Administrators" (Carver, Waters); "Comparative Study of the Public's Knowledge and Assessment of the Purpose and Programs of the Texas Agricultural Extension Service in Metropolitan Versus Nonmetropolitan Counties" (Summers, Jr., Herring); "Self-Perceived Motivation of Mississippi Extension Agents as Compared to Their Performance" (Djire, Newman); "Adoption of Distance Education Technologies in AE" and "Needs Assessment of Agriculture Faculty Regarding Distance Education" (Murphy, Terry); "Science Credit for Agriculture" (Johnson); "Analysis of the Agriscience Laboratory Safety Practices of Louisiana Vocational Agriculture Teachers" (Fletcher, Miller); "Effects of Safety Instruction upon Safety Attitudes and Knowledge of University Agricultural Engineering Students" (Seaboch, Kirby); "Air Quality in Secondary Agricultural Mechanics Laboratories" (Lacewell et al.); "Feasibility of Implementing a Farm Business Management Program for Farmers in Northeast Texas" (Lambright, Klingbeil); "Perceptions by the Nursery Industry of the Higher Education Horticultural Needs of Beginning Employees" and "Perceptions by the Nursery Industry of the Higher Education Support Course Needs of Beginning Employees" (Baker, McLaughlin); "Perceptions Regarding Planning Activities and Supervision Strategies for Supervised Agricultural Experience Programs (SAEP)" and "Perceptions of Tennessee AE Teachers Regarding the Importance of SAEP" (Swortzel); "Perceptions of North Carolina Secondary School Principals Concerning Vocational Education Programs in AE" (Jewell); "Pre-Test/Post-Test Analysis of Selected Minority High School Students' Attitudes and Definitions of Agriculture" (Rudd, Smick-Attisano); "Career Aspirations of Minority Youth in One Community in the Rural Mississippi Delta Region of the U.S." (Wardlow, Scott, Graham); "Agricultural Education and Land-Grant Institutions" (Herren, Hillison); and "Assessment of Clientele Preferences for Receiving Extension Information" (Richardson). (KC)

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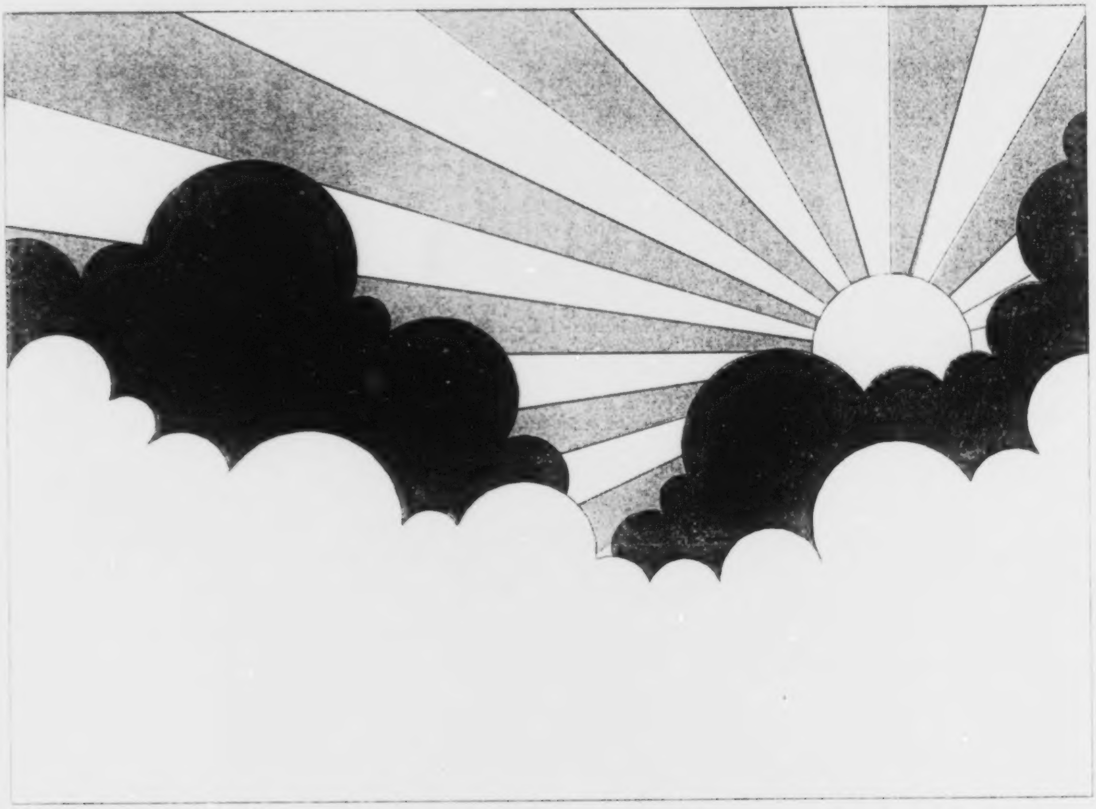
Research in Agricultural Education



Proceedings of the Forty-Fourth Annual

Southern Agricultural Education Research Meeting

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March 19-20, 1995
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PROCEEDINGS

# of the

SOUTHERN AGRICULTURAL EDUCATION RESEARCH MEETING

compiled and edited

by

Jim Flowers, Chair
44th Annual
Southern Agricultural Education Research Meeting

and

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March 19-20, 1995

Wilmington, North Carolina

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Richard G. Snyder, Mississippi Agricultural and Forestry Experiment Station

Acknowledgments

The 44th Annual Southern Agricultural Education Research Meeting and these Proceedings are the products of many hours of dedication and hard work of many people. Over a hundred members of the profession from all across the United States have worked together in an effort to make this research meeting a success. First, I want to thank all of those who prepared and submitted papers for consideration for presentation at this meeting. The quality of the papers submitted is a testimony of your professionalism and research ability. Also, a special thank you is in order for those anonymous reviewers who spent many hours in reading and providing feedback to me on the selection process, as well as specific comments to authors. Others who have made valuable contributions to this meeting are the discussants who agreed to review the papers and lead the discussion during the meetings, those who participated in the selection of the outstanding papers for the conference, and the chairs and facilitators who made sure that each session operated smoothly.

As the chair for the 1995 Southern Agricultural Education Research Meeting, I want to personally express my most sincere appreciation for the following individuals for their assistance to me:

> to Mr. Charles Keels and Dr. Gary Moore, Southern Agricultural Education Conference Co-Chairs, who have assisted with numerous details and helped to coordinate activities of both conferences;
>
> to colleagues in the Department of Agricultural and Extension Education, Drs. Larry Jewell and Barbara Kirby, who have assisted whenever I have needed special help;
>
> to Dr. James P. Key for agreeing to provide some thoughtful direction for the profession in the keynote address for the research meeting;
>
> to Dr. Joe Harper for all of the information he passed along as the chair of last year's research meeting;
>
> to Ms. Janina Widener for her assistance in communicating with all of the individuals involved and in compiling the Proceedings and finally;
>
> to Mrs. Peggy Flowers, Keith, Karen, and Carrie for their understanding as I devoted time to this effort.

This research meeting would not have been successful without the efforts of all of those mentioned above, who have contributed their time and their considerable talents in order that the profession would benefit. On behalf of the participants in the 1995 Southern Agricultural Education Research Meeting, I want to thank each of those who contributed.

Jim Flowers, Chair
1995 SAERM

1995 SAERM Program

SUNDAY, MARCH 19
10:30 a.m. - 12:00 noon

Concurrent Session A: Agricultural Communications and Leadership Development Programs
-- Garden Room

Chairperson: Francis O. Walson, North Carolina Agricultural & Technical State University
Facilitator: Alvin Larke, Jr., Texas A&M University

Topic 1: *An Evaluation of the Leadership Development of Oklahoma Agricultural Leadership Program Graduates*
Authors: Kelly Lee-Cooper, Oklahoma State University, Bill Weeks, Oklahoma State University

Topic 2: *A Model for Undergraduate Academic Programs in Agricultural Communications*
Authors: Robert Terry, Jr., Texas A&M University; Jacqui Lockaby, Texas Tech University; Frankie Joyce Bailey-Evans, Texas Tech University

Topic 3: *Competencies Needed for Graduates of Agricultural Communications Programs*
Authors: Robert Terry, Jr., Texas A&M University; Frankie Joyce Bailey-Evans, Texas Tech University

Discussant: Jacquelyn P. Deeds, Mississippi State University

Concurrent Session B: Characteristics of Agricultural Education Teachers
-- Carolina/Tidewater Room

Chairperson: Larry Klingbeil, East Texas State University
Facilitator: Stan Burke, Virginia Tech

Topic 1: *Mathematical Problem-Solving Proficiency of Agricultural Education Teachers in Alabama*
Authors: Frankel S. Hunnicutt, Mississippi State University and Michael E. Newman, Mississippi State University

Topic 2: *Learning Styles of Agricultural Education Pre-Service Teachers*
Authors: Matt Raven, Mississippi State University; Bryan Garton, University of Missouri; Jamie Cano, The Ohio State University

Topic 3: *The Relationship of Teacher Knowledge and Personal Development of Human Relations Skills in Agricultural Education*
Authors: Billye B. Foster, East Texas State University; Eddie Finley, Oklahoma State University

Discussant: Carey Ford, North Carolina A&T State University

12:00 noon - 1:30 p.m. **LUNCH**

1:30 - 3:00 p.m.

Concurrent Session C: Roles and Responsibilities of Extension Agents
-- Garden Room

Chairperson: Richard Poling, Clemson University

Facilitator: Roy Lessley, University of Tennessee

Topic 1: *The Roles of Tennessee Extension 4-H Specialists as Perceived by Agents, Specialists, and Administrators: A Delphi Study*
Authors: Carla N. Carver, University of Tennessee; Randol G. Waters, University of Tennessee

Topic 2: *A Comparative Study of the Public's Knowledge and Assessment of the Purpose and Programs of the Texas Agricultural Extension Service in Metropolitan Versus Nonmetropolitan Counties*
Authors: Frank R. Summers, Jr., Agricultural Consultant, Cameron, Texas; Don Herring, Texas A&M University

Topic 3: *Self-Perceived Motivation of Mississippi County Extension Agents as Compared to Their Performance*
Authors: Issa Djire, Mississippi State University and Michael Newman, Mississippi State University.

Discussant: Donna Graham, University of Arkansas

Concurrent Session D: Alternative Delivery and Credit for Agricultural Education
-- Carolina/Tidewater Room

Chairperson: Bill Weeks, Oklahoma State University
Facilitator: Billye Foster, East Texas State University

Topic 1: *Adoption of Distance Education Technologies in Agricultural Education: A National Delphi*
Authors: Tim Murphy, Texas A&M University; Robert Terry, Jr, Texas A&M University

Topic 2: *Needs Assessment of Agriculture Faculty Regarding Distance Education*
Authors: Tim Murphy, Texas A&M University; Robert Terry, Jr, Texas A&M University

Topic 3: *Science Credit for Agriculture: Perceptions of Arkansas Agriculture Teachers*
Author: Donald M. Johnson, University of Arkansas

Discussant: Matt Baker, University of Florida

3:00 - 3:30 p.m. BREAK
-- Concourse/Lower Lobby

3:30 - 4:30 p.m.

General Session: Keynote Address
-- Azalea Room

Chairperson: Jim Flowers, North Carolina State University
Facilitator: Ray Herren, University of Georgia

Better Ways Through Better Research. James P. Key, Professor, Agricultural Education, Oklahoma State University

MONDAY, MARCH 20
8:00 - 9:30 a.m.

Concurrent Session E: Safety in Agricultural Mechanization
-- Garden Room

Chairperson: Jeff Horne, Southern Arkansas University
Facilitator: Michael Newman, Mississippi State University

Topic 1: *An Analysis of the Agriscience Laboratory Safety Practices of Louisiana Vocational Agriculture Teachers*
Authors: William Fletcher, Baskin High School, Baskin, LA.; Allen Miller, Rayne High School, Rayne, LA

Topic 2: *Effects of Safety Instruction Upon Safety Attitudes and Knowledge of University Agricultural Engineering Students*
Authors: Timothy R. Seaboch, North Carolina State University; Barbara M. Kirby, North Carolina State University

Topic 3: *Air Quality in Secondary Agricultural Mechanics Laboratories*
Authors: Tommy Blake Lacewell, Coronado High School, Lubbock, TX; David E. Lawver, Texas Tech University; Steven D. Fraze, Texas Tech University

Discussant: Donald Johnson, University of Arkansas
Concurrent Session F: Continuing Education in Agriculture
-- Carolina/Tidewater Room

Chairperson: Jack Rudolph, Western Kentucky University
Facilitator: Tim Murphy, Texas A&M University

Topic 1: *The Feasibility of Implementing a Farm Business Management Program for Farmers in Northeast Texas*
Authors: Allen M. Lambright, East Texas State University; Larry J. Klingbeil, East Texas State University

Topic 2: *Perceptions by the Nursery Industry of the Higher Education Horticultural Needs of Beginning Employees*
Authors: Matt Baker, Assistant Professor, University of Florida; Peggy McLaughlin, California State Polytechnic University

Topic 3: *Perceptions by the Nursery Industry of the Higher Education Support Course Needs of Beginning Employees*
Authors: Matt Baker, Assistant Professor, University of Florida; Peggy McLaughlin, California State Polytechnic University

Discussant: George Wardlow, University of Arkansas

9:30 - 10:00 a.m. **BREAK**
-- Lower Lobby/Concourse

10:00 - 11:30 a.m.

Concurrent Session G: Secondary Agricultural Education Programs
-- Garden Room

Chairperson: Carl Beeman, University of Florida
Facilitator: Lance Kieth, Texas Tech University

Topic 1: *Perceptions Regarding Planning Activities and Supervision Strategies for Supervised Agricultural Experience Programs*
Author: Kirk A. Swortzel, The Ohio State University

Topic 2: *Perceptions of Tennessee Agricultural Education Teachers Regarding the Importance of Supervised Agricultural Experience Programs*
Author: Kirk A. Swortzel, The Ohio State University

Topic 3: *Perceptions of North Carolina Secondary School Principals Concerning Vocational Education Programs in Agricultural Education*
Author: Larry R. Jewell, North Carolina State University

Discussant: Robert Terry, Jr., Texas A&M University

Concurrent Session H: Perceptions of Minorities Toward Agriculture/History of Ag Ed Programs
-- Carolina/Tidewater Room

Chairperson: Matt Raven, Mississippi State University
Facilitator: Rod Tulloch, University of Kentucky

Topic 1: *A Pre-Test/Post-Test Analysis of Selected Minority High School Students' Attitudes and Definitions of Agriculture*
Authors: Rick D. Rudd, University of Florida; Regina Smick-Attisano, Virginia Tech

Topic 2: *Career Aspirations of Minority Youth in One Community in the Rural Mississippi Delta Region of the U.S.*
Authors: George Wardlow, University of Arkansas; Freddie Scott, University of Arkansas; Donna Graham, University of Arkansas

Topic 3: *Agricultural Education and Land-Grant Institutions - The Rest of the Story*
Authors: Ray Herren, University of Georgia; John Hillison, Virginia Tech

Discussant: Barbara Kirby, North Carolina State University

Concurrent Session I: Delivery of Extension Programs
-- Azalea Room

Chairperson: Don Herring, Texas A&M University
Facilitator: Austin Bull, North Carolina A&T State University

Topic 1: *An Assessment of Clientele Preferences for Receiving Extension Information*
Author: John Richardson, North Carolina State University

Topic 2: ***Assessment of Program Delivery Methods and Media Concerning Chemical Regulations in Agriculture and Lawn and Garden Uses by Selected Cooperative Extension Personnel in Oklahoma***
Authors: Roy Lee Lindsey, Jr., Oklahoma State University; James P. Key, Oklahoma State University

Topic 3: ***A Description of Greenhouse Tomato Growers and Their Use of an Extension-Recommended Integrated Pest Management Program***
Authors: Tzu-Chin Rejoice Chou, Mississippi State University; Michael E. Newman, Mississippi State University; Frank Killebrew, CES, Mississippi State University; Richard G. Snyder, Mississippi Agricultural and Forestry Experiment Station

Discussant: Randol G. Waters, University of Tennessee

11:30 - 11:40 a.m. **SHORT BREAK**

11:40 a.m. - 12:00 noon

General Session: Research Conference Business Meeting
-- Azalea Room

Chairperson: Ray Herren, University of Georgia
Facilitator: Bill Weeks, Oklahoma State University

12:00 noon **ADJOURN**
(Southern Agricultural Education Conference Begins at 1:30 p.m.)

AN EVALUATION OF THE LEADERSHIP DEVELOPMENT OF OKLAHOMA AGRICULTURAL LEADERSHIP PROGRAM GRADUATES

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AN EVALUATION OF THE LEADERSHIP DEVELOPMENT OF OKLAHOMA AGRICULTURAL LEADERSHIP PROGRAM GRADUATES

INTRODUCTION AND THEORETICAL FRAMEWORK

Agriculture is in a constant state of change, bringing with it many concerns about the future of the agriculture industry. Issues such as diversity in agricultural production, increasing international trade, and increasing environmental legislation and regulations are creating an environment in which agriculturists must be informed and equipped with the necessary knowledge and skills in order for them to be able to assume leadership responsibilities to address the many challenges that face agriculture. The Oklahoma Agricultural Leadership Program (OALP) was developed to help Oklahoma agriculturists learn the skills needed to deal with challenging agricultural issues and concerns. The program was designed to provide these young adults with training and experience necessary to help them assume leadership roles and positions in their community and state. Their involvement plays an important part in the future of agriculture in Oklahoma and the future of Oklahoma agriculture in the total economy (Oklahoma Agricultural Leadership State Advisory Council & Division of Agriculture OSU, 1985).

Byler (1982) pointed out that because the agricultural industry has changed so much over the years, there has become a greater need for competent and aggressive agricultural leaders. Coffey (1991) stated that providing leadership in agriculture is one of the most challenging missions facing agriculturists. To address these issues adequately, agriculturists must prioritize leadership training beginning with acquainting or reacquainting themselves with a changing agriculture industry.

A number of studies of agricultural leadership programs have been conducted. In their evaluation of agricultural leadership development programs in Pennsylvania, Montana, Michigan and California, Howell, Weir, and Cook (1979) reported that participants increased interest in public affairs, personal growth, and self-worth as a result of the program. Other major findings of this study included increased involvement of many program graduates in related public affairs activities including: new memberships and officerships in government and voluntary public service organizations; increased involvement of many program graduates in public affairs activities that were at least regional in scope, including appointments on regional planning commissions and health councils and increased leadership and problem-solving skills of program graduates.

Olson (1992) conducted a case study to assess the growth in the transactional and transformational leadership skills of graduates that they attributed to their involvement in the Washington Agriculture and Forestry Education Foundation's (WAFEF) two year program. Results indicated that participants increased their use of both transformational leadership skills and transactional leadership skills. High correlations were found between several skill variables and transformational leadership including personal goal setting, vision, ethics, team building, self assessment processes, ability to inspire others, trust building, environmental scanning, empowering others, value clarification, and group conflict management. Operational goal setting was found to be highly correlated to transactional leadership. Participants identified three program factors they felt made the greatest difference in their leadership development with those including the refining of a variety of leadership skills, gaining a greater understanding of issues, and an increased confidence in achieving tasks, public speaking, inner strength, personal ideas, and willingness to take risks (Olson, 1992).

Whent and Leising (1992) conducted a twenty-year evaluation of the California Agricultural Leadership Program with the purpose of evaluating the impact of the program on its participants and identifying any suggestions for program changes and modifications to the curriculum. The researchers found that participants positively rated themselves as significantly changing in the program objectives, their family and peer relationships, and their leadership skills as a result of the program. Participation in the program increased local community involvement of the graduates and helped them attain state association positions and advancements in their careers.

In 1986, an evaluation was conducted of the Leadership Education Action Development (LEAD) program in Nebraska. The study used a static-group comparison design involving three groups. Researchers found that when the LEAD alumni group was compared with the other two groups, they tended to be more active and hold offices in a greater variety of agricultural related organizations. They had a broader view of the agriculture industry and tended to be more understanding and tolerant of others not directly involved in agriculture (SRI Research, Inc., 1986).

Andelt and Dillon, (1993) conducted a later research study of the leadership involvement of LEAD Alumni. These researchers examined the experience of LEAD Fellows, who were by that time LEAD Alumni, ten years after applying for the program, and compared their experience with persons who applied but were not selected for the LEAD program during the same time period (Control Group Applicants). Results indicated that LEAD Alumni were different from the Control Group Applicants in that LEAD Alumni held membership in more state organizations, held a greater number of officer positions (President), devoted more hours per month to organizations in which they belonged, and had a greater increase in officer positions per person from the time of application for the program to the time of the study.

Martin (1977) and Howell and Wilkinson (1977) conducted a study of the three-year Pennsylvania Leadership Program. Martin (1977) post-tested participants immediately after graduation from the program, while Howell and Wilkinson (1977) post-tested participants two years after graduation. After the initial group began the program, a nonequivalent comparison group was identified and similar information was gathered. Martin found that the effects of socioeconomic status, age, and gender variables were not related to political participation or membership in public affairs-related organizations and economic associations. Howell and Wilkinson (1977) found that participants had significantly higher participation in public affairs-related and economic organizations than the comparison group. The researchers identified a trend away from participation in nongovernmental, voluntary public service organizations and an increase in participation in organizations having legislative authority to act on behalf of the community.

A great deal of research has been conducted on the type of persons who participate in voluntary community organizations. Babchuk and Booth (1969) gave a broad description of voluntary associations by stating that "they provide a setting in which to engage in expressive activities, function as vehicles to implement special personal interests, and may provide effectual support for the individual" (p. 31). Voluntary associations were also described as important agencies that support (or try to change) the normative order, help to distribute power at the grass roots level, function as service organizations, and reinforce important values (Babchuk & Booth, 1969).

Studies have found that membership in voluntary community organizations varies according to certain background characteristics. Fairly consistent relationships between age, marital status, and home ownership and participation in voluntary associations have been found. It has been found that persons in their mid-thirties to early fifties are much more likely to belong to voluntary associations than either younger or older persons (Babchuk & Booth; 1969; Scott, 1957; Hausknecht, 1962). Married people are more likely to be members of voluntary associations than people who are single, widowed, or divorced (Babchuk & Booth, 1969; Hausknecht, 1962). Homeowners are more likely to be members of voluntary groups than are renters (Scott, 1957; Hyman & Wright, 1958; Hausknecht, 1962).

Several researchers have defined social or community participation as the number of affiliations with voluntary organizations (Chapin, 1939; Poole, 1981). Many studies in this field have used the Chapin Social Participation Scale or a variation of the scale to describe organizational involvement such as number of memberships, and frequency of attendance at meetings, and participation in organizations as measured by committee memberships, holding an office, and financial contributions. Chapin (1939) found that the scale measured pure social participation in organized group activities, the concept of social acceptance and the processes of so-called leadership.

Studies of community participation and leadership development have also been conducted concerning the cooperative extension service, 4-H and the FFA (Langone, 1992; Bolton, 1991; Ladewig & Thomas, 1987; and Brannon, 1988). Extension has been looked on as a source of knowledge and expertise for rural communities. Due to the challenging and complex issues facing communities today that are outside the traditional areas of agriculture and home economics, the role of Extension had been questioned. Langone (1992) conducted a study of Georgia's Community Leadership Program to show that county Extension programs can serve as a viable resource in helping communities face social and economic change. The Community Leadership Program was found to have a positive impact in the areas of networking, the role of Extension as a community resource, creating a unified spirit among community leaders, and increasing levels of involvement and levels of diversity in activities and participation.

PURPOSE AND OBJECTIVES

The purpose of this study was to conduct a follow up of graduates of the Oklahoma Agricultural Leadership Program to gather their perceptions concerning the impact of the program on their participation in organizations, their leadership involvement in such organizations, and the impact of the OALP on leadership skills. The objectives of the study were the following:

1. To update and describe the demographic characteristics of the Oklahoma Agricultural Leadership Program (OALP) participants.

2. To describe the participants' perceptions of the extent of participation and leadership involvement in organizations and activities since participation in the OALP.

3. To describe the participants' perceptions of the impact of the OALP on selected leadership skills.

The scope of this study included Oklahoma Agricultural Leadership Program participants from six classes spanning the years 1982 through 1994.

METHODS AND PROCEDURES

The follow-up evaluation of OALP graduates was based on a descriptive design. OALP graduates were identified and then surveyed by a mailed questionnaire as to their opinions of, and participation in the program. The results can only be generalized to the OALP participants.

The Oklahoma Agricultural Leadership Program Follow-up Study of Graduates questionnaire was developed by the researcher and used to collect both quantitative and qualitative data. The questionnaire consisted of five sections which included: Background Information, Program Objectives, Organizational/Leadership Involvement and Activities, Leadership, and Program Improvements. Surveys were received from 100 graduates (58.48 percent). In order to determine that the remaining 41.52 percent of the population were not different from the respondents, nonrespondents were "double-dipped" (Barrick, Miller, Van Tilburg, & Warmbrod, 1985, p. 23). A random sample of 10 percent (seven) of the nonrespondents was drawn. Telephone interviews were then conducted to obtain data from the sample using the questionnaire as an interview schedule. A t-test analysis revealed no difference in rating of appropriateness and extent of accomplishment of program objectives, personal leadership skills, or participation scores between the respondent and nonrespondent groups. The nonrespondent group data were pooled with those of the respondent group giving a grand response rate total of 107 and 62.57 percent.

Table 1. Distribution of Responding OALP Graduates by Cass and in Aggregate

	N of Class	N of Respondents	% of Class	% of Total Respondents
Class I	28	14	50.00	13.08
Class II	30	12	40.00	11.22
Class III	29	17	58.62	15.89
Class IV	25	20	80.00	18.69
Class V	29	23	79.31	21.49
Class VI	30	21	70.00	19.63
Total	171	107	(62.57%)	100.00

Demographic data were analyzed using frequencies and percentages and reported in the aggregate. Descriptive statistics or summary statistics (means and standard deviations) were employed to describe data from the four-point Likert-type scaled item responses in the "Leadership" portion of the questionnaire. Leadership skills were measured by respondent self-reported change from pre- to post program participation. Data were reported in the aggregate. The scale was designed so that the perceptions of participants could be rated on a scale of one to four with one being low and four being high. The real limits used for interpretation categories were the following: Low: 1.00-1.49; Moderate: 1.50-2.49; Above Average: 2.50-3.49; and High: 3.5-4.00. OALP graduates were questioned about their participation in organizations and activities since their participation in the OALP. Class VI data was not used due to the small amount of time having passed since their graduation from the program. Participation and leadership involvement in organizations and activities was measured for Classes I through V by modifying Chapin's Social Participation Scale (1937). A participation scale was constructed and respondents were given a score that was calculated by using the following weighted scale: membership, one point; attendance, two points; committee membership, three points; and office held, four points. Based upon the previous research of Ladewig and Thomas (1987), and Brannon (1988), these scores were selected to put more emphasis on committee membership and officer involvement. The values were then summed to produce a range of scores from zero (no participation) to ten (a member who attended at least 25 percent of the meetings in the past year, served on a committee and served as an officer) (Weeks, 1989). An overall participation score was then calculated by adding each value per organization. Scores for leadership in organizations were determined by removing "membership" and "attendance categories" leaving "committee membership' and "office held" to make up the leadership scale (Weeks, 1989).

RESULTS AND/OR FINDINGS

The first objective of the study was to update and describe demographic characteristics of the OALP participants. Demographic information arranged into a profile and presented in Table 2 indicates the respondents were overwhelmingly married (86 percent), white (92 percent), males (88 percent).

Table 2. Profile of Responding OALP Graduates

Variable		Percentage
Gender	Male	88.79
Ethnicity	White	92.52
Marital Status	Married	86.92
Highest Education Completed	Bachelor's	64.49
Current Occupation	Production Agriculture	45.79
Current Residence	Farm	57.01

Objective two was to describe the participants' perceptions of the extent of participation and leadership involvement in organizations and activities since participation in the OALP. A composite participation score was calculated by totaling each individual score per organization and/or activity for each respondent. Table 3 displays the frequencies of total participation scores for respondents from Classes I through V. Class VI data was not utilized in this portion of the study. Over 50 percent of respondents' scores ranged from 0 to 29 with the mean score being 28.11.

The researcher categorized respondents' self-reported organizations. Some respondents listed acronyms of organizations to which they belonged leaving interpretation up to the researcher. The researcher consulted with faculty members of the Department of Agricultural Education, Communications and 4-H Youth Development, Oklahoma State University, concerning the acronyms and assignment to categories. The following categories were developed: agricultural organizations/associations, civic associations, church or religious organizations, social organizations, school/education associations, political associations, professional associations, and military associations.

Table 3. Distribution of Respondents Composite Participation Scores

Composite Scale Score		Frequency (n=86)	Percentage
0 - 4		6	6.98
5 - 9		4	4.65
10-14		11	12.79
15-19		11	12.79
20-24		12	13.95
25-29		8	9.30
30-34		5	5.81
35-39		7	8.14
40-44		6	6.98
45-49		5	5.81
50-54		1	1.16
55-59		5	5.81
60-64		2	2.33
65-69		0	0.00
70-74		2	2.33
75-79		0	0.00
80-84		0	0.00
85-89		1	1.16
Mean Score:	28.11		
Standard Deviation	18.28		

Table 4 indicates the frequency of responses in the previously described categories. The number of associations individual participants belonged to ranged from 0 to 15 with a mean of 4.66 organizations reported. These findings are consistent with those studies that have shown multiple membership as a common occurrence (Scott, 1957; Hyman and Wright, 1971; and Bolton, 1991) but vary in that the majority of participants belonged to more than two associations.

Table 4. Distribution of Respondents as to Organizational Participation

Organization	Frequency
Agricultural	178
Civic	90
Church	48
Social	31
School	25
Political	16
Professional	11
Military	2
Total	401

Respondents' leadership in organizations and activities was computed by removing "membership" and "attendance" from the participation scale score. "Committee membership" and "office held" remained to constitute the leadership scale score.

Table 5. Distribution of Respondents' Composite Leadership Scores

Composite Scale Score		Frequency (n=86)	Percentage
0 - 4		12	13.95
5 - 9		17	19.78
10-14		22	25.58
15-19		5	5.81
20-24		8	9.30
25-29		7	8.14
30-34		6	6.98
35-39		3	3.49
40-44		1	1.16
45-49		3	3.49
50-54		0	0.00
55-59		1	1.16
Mean	16.15		
Standard Deviation	12.55		

Table 6. Descriptive Analysis of Class I through Class VI Combined Respondents' Self Reported Changes in Leadership Skills from Pre- to Post Program Participation

Statement	Before Mean S.D.	Interpretation	After Mean S.D.	Interpretation	Gain	t-value
1. Your willingness to accept leadership responsibility.	2.67 0.82	Above Average	3.44 0.55	Above Average	0.77	9.62*
2. Knowledge of your limits and strengths as a leader.	2.38 0.74	Moderate	3.34 0.58	Above Average	0.96	12.85*
3. Your skills in solving problems.	2.81 0.65	Above Average	3.24 0.58	Above Average	0.43	7.98*
4. Your skills in decision making.	2.82 0.66	Above Average	3.31 0.56	Above Average	0.49	8.23*
5. Confidence in expressing your opinions in large group settings.	2.32 0.82	Moderate	3.51 0.64	High	1.19	15.61*
6. Confidence in answering questions in large group settings.	2.30 0.80	Moderate	3.45 0.64	Above Average	1.15	18.12*
7. The amount of detail work you delegate to others.	2.29 0.69	Moderate	2.97 0.69	Above Average	0.68	10.36*
8. The amount of authority you delegate to others	2.33 0.65	Moderate	3.00 0.70	Above Average	0.67	9.77*
9. The network of people you may contact for help or information.	2.11 0.69	Moderate	3.78 0.46	High	1.67	20.73*
10. The extent to which you involve others in . establishing or setting goals.	2.08 0.66	Moderate	3.01 0.65	Above Average	0.93	14.85*

* p< .0001

Objective three was to describe the participants' perceptions of the impact of the OALP on selected leadership skills. This impact was measured by respondent self-reported change from pre- to post-program participation. Table 6 indicates the mean, standard deviation, interpretation, and gain or loss in mean of respondents' leadership skills both prior to and after participation in the OALP. T-values are also indicated. Kerlinger (1986) noted that while Likert-type data is ordinal in nature, it is acceptable and practical to treat it as interval data and subject it to statistical analysis as long as care is taken in the interpretation of the findings. Table 6 indicates an increase in means of all leadership statements. The greatest gain was indicated in statement nine "the network of people you may contact for help or information." There was found to be a significant difference in all of the responses of study participants.

OALP participants were asked to list their personal objectives for entering the program. The top three categories included: to learn, and/or improve upon leadership skills; to build a network of acquaintances in the agriculture industry; and to broaden knowledge and understanding of Oklahoma agriculture.

Table 7. Distribution of Respondents' Personal Objectives for Entering OALP

Objectives	Frequency
Improve leadership skills	37
Networking	34
Broaden knowledge of agriculture	32
Broaden knowledge of policy and politics affecting agriculture	13
Increase awareness of issues affecting Oklahoma agriculture	13
Personal development	10
Broaden horizons	8
New opportunity	4
Travel abroad	3
Miscellaneous	3
No Response	1

CONCLUSIONS AND RECOMMENDATIONS

Based on the analyses of data collected for this study, conclusions were drawn concerning the impact and effectiveness of the Oklahoma Agricultural Leadership Program.

1. Since participation in the OALP, respondents have remained overwhelmingly stable in marital status and occupation, and non-mobile in residence. Stability in occupation and non-mobility in residence would seem to go hand-in-hand as it would be difficult to relocate farming and/or ranching operations.
2. A limited number of qualified females and minorities have benefited through participation in the OALP.

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3. Respondents held a large number of memberships in a variety of community voluntary associations.
4. Respondents were highly involved in agricultural organizations and civic organizations.
5. Respondents perceived that the program directly impacted their leadership skills and development in a positive way.
6. Respondents indicated increased networking skills, increased confidence in expressing their opinions in large group settings, and increased confidence in answering questions in a large group setting.
7. The personal objectives of increasing leadership and networking skills were listed by respondents. In looking at the conclusions for Objective 3, it would appear that these personal objectives were at least addressed if not reached.

Based on the aforementioned findings and conclusions, the following recommendations are made for consideration:

1. Stakeholders in the OALP should specifically target recruitment efforts towards females and minorities involved in Oklahoma agriculture.
2. It is recommended that the OALP continue in its efforts to build leadership skills of participants.
3. As part of the program, on-going evaluations should be expanded to include pre and post measures of participants' perceptions and leadership skills.
4. Further study of the first three classes of the OALP is recommended which would incorporate a more intensive look at the participants and their organizational participation.

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A MODEL FOR UNDERGRADUATE ACADEMIC PROGRAMS IN AGRICULTURAL COMMUNICATIONS

by

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INTRODUCTION AND THEORETICAL BASE

The need for taking a proactive approach to informing the public about the importance of agriculture and the public's dependence upon it has never been more crucial. Reversing the trends of low awareness and inaccurate perceptions of agriculture will take well-organized, concerted efforts on the part of educators, commodity groups, agri-businesses and governmental agencies. There is a great need for individuals who are knowledgeable of the field of agriculture and possess the abilities and skills needed to communicate information about agriculture to others. It is for this reason that academic programs in agricultural communications have begun to flourish in colleges of agriculture across the United States (Terry, et al, 1994).

The first agricultural communications programs were developed primarily to help disseminate information discovered and created at the experiment stations of land grant universities (Duley, Jensen & O'Brien, 1984). Duncan (1957) reported the need for academic programs to prepare agricultural journalists was identified and by 1920, a Bachelor of Science degree in Agricultural Journalism was offered at Iowa State College. By 1928, there were seven colleges offering courses in agricultural journalism.

According to Duley, Jensen & O'Brien (1984), the next era of significant growth for agricultural journalism programs was in the 1960s. More than half of the programs that existed in 1984 began after 1961 and most of those programs originated with initial courses offered through agricultural education programs. Evans (1975) found an evolution had taken place in the terminology used to describe these programs. Most programs became identified as "agricultural communication(s)" rather than "agricultural journalism." As of 1991, there were more than 30 such programs at colleges and universities across the nation (Doerfert and Cepica, 1991).

Modern agricultural communications programs have a broader mission than to simply prepare journalists for agricultural newspapers and magazines. In 1984, Evans recognized the impact new communications technologies such as satellites and computers would have a direct impact upon agricultural communications. Because of these changes, and continuous developments in technical agriculture, Evans (1969), Paulson & Metzger (1990), and Flatt (1991) all stated the need to investigate curricular change to better prepare students to enter careers related to agricultural communications.

Bailey-Evans (1994), in a study funded by the USDA Challenge Grants Program, suggested a model curriculum be developed to provide guidelines to be used by colleges and universities to design or enhance agricultural communications curricula to meet the needs of the industry and future professionals. She recommended this model be based upon disciplines and competencies identified in her research that surveyed leaders in agricultural communications.

PURPOSES AND OBJECTIVES

The purpose of this study was to develop a model curriculum that could be used to develop new or enhance existing undergraduate programs of agricultural communications.

The specific objectives formulated to accomplish this purpose were:

1. Consolidate and organize the data collected by Bailey-Evans (1994) in a national Delphi study concerning disciplines and competencies needed for agricultural communications graduates into a logical model curriculum design.
2. Categorize the disciplines identified by Bailey-Evans (1994) into core areas.
3. Develop specific instructional objectives for each of the competency areas identified by Bailey-Evans (1994).

METHODS AND PROCEDURES

A panel of experts consisting of agricultural communications professionals, faculty members from two institutions, graduate students studying agricultural communications, and undergraduate students pursuing degrees in agricultural communications was formed for the purpose of this project. The charge of the panel was primarily to compete the first two objectives of this study.

Members were provided data gathered in the research conducted by Bailey-Evans (1994). The project conducted by Bailey-Evans was a modified Delphi study designed to identify a group of disciplines and competencies in which graduates of agricultural communications should be proficient. In her research, Bailey-Evans formed a jury consisting of leaders from the seven primary professional organizations related to agricultural communications careers. Specifically, this group was made up of journalists, public relations specialists, broadcasters, administrators, extension specialists, educators, and students. Through the use of a three-round instrument, the jury identified 26 broad discipline areas and, within those, 83 concepts.

A group of faculty representing 24 departments and six universities was consulted to determine specific objectives for each of the competencies. Faculty who teach and/or research each competency were asked to contribute a list of instructional objectives necessary to help students become proficient in their area of expertise.

The panel of experts for the research discussed in this paper met face to face, by phone conference, and also communicated via mail and electronic mail. The panel used data collected by Bailey-Evans, materials collected from programs of agricultural communications and agricultural journalism across the nation, and the contribution of the faculty group in accomplishing its tasks. The group reached consensus on each of the objectives of their charge.

A project report entitled "Enhancing the Agricultural Communications Curriculum: A Vision for the Future" (Terry, et al, 1994) was produced by the group and distributed to all agricultural communications programs in the nation. In July of 1994, a meeting of educators and professionals in agricultural communications was held to disseminate and validate the results of the project.

RESULTS

Organization of Curriculum Information

Figure 1 illustrates of the levels of the curriculum model. The first, most basic level of the model was labeled "core areas." The disciplines identified in the national modified Delphi study by Bailey-Evans (1994) were grouped into these core areas and formed the second level of the model. The disciplines are broad areas in which graduates of agricultural communications programs should be knowledgeable.

The third level of the model was competencies. For each discipline, a set of competencies was identified by the jury of experts in the study by Bailey-Evans (1994). These competencies describe proficiencies agricultural communications students should have upon graduation. The fourth level is composed of the instructional objectives for each of the competencies. Instructional objectives specifically describe behaviors, skills, and activities students should be able to perform to develop necessary competencies.

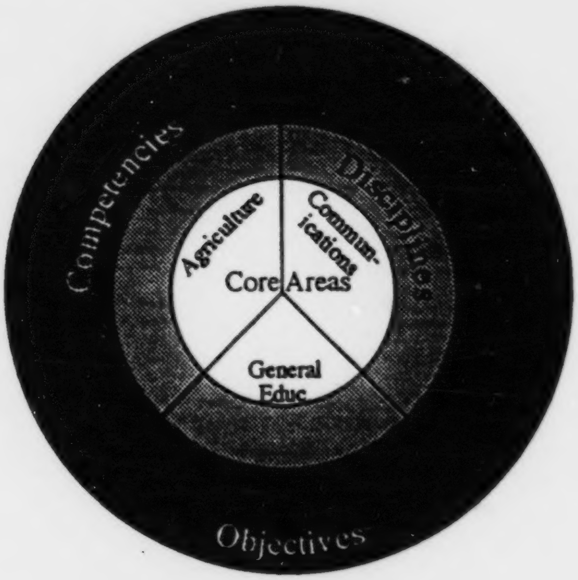

Figure 1. Levels of Model Curriculum.

Categorization of Disciplines

The disciplines fit into three logical categories. Agriculture was composed of those disciplines typically associated with and often offered in academic programs of agricultural sciences and natural resources. All but "Internship Experience" included terms closely associated with agriculture. Internship Experience was placed in this group because most internships for agricultural communications would be supervised by academic advisors who, in most cases, are faculty of colleges of agriculture (Doerfert & Cepica, 1990).

Seven disciplines clustered in the Communications core area. Each of these disciplines involved oral or written communications or technologies and arts used in media productions. The remaining 13 disciplines were placed in the area General Education. Disciplines normally part of university core curriculum were placed in this group along with disciplines that did not logically fit into the other two categories. The core areas with their respective disciplines are displayed in Table 1.

Table 1
Categorization of Disciplines in Core Areas

General Education Core Area	**Communications Core Area**	**Agriculture Core Area**
English Government/Political Science History International Relations Mathematics Biological Sciences Physical Sciences Psychology Sociology Business Marketing Computer Applications	Advertising Journalism Mass Communications Law Photography Public Relations Public Speaking Telecommunications	Agricultural Communications Agricultural Economics Agricultural Leadership Agronomy Animal Science Environmental Sciences Food Sciences Technology Internship Experience

Instructional Objectives

Faculty members specializing in the competency areas were consulted to provide input in the design of instructional objectives. After these data were gathered, the researchers edited the objectives into a consistent format to meet the purposes of this research. Eighty objectives were developed for General Education competencies, 71 were developed for Communications, and 88 were developed for Agriculture. Figures 2 - 4 display the disciplines, competencies, and objectives for each of the three core areas.

Agricultural Communications

Communicating Ag to Public (Domestic)

- describe the impact of agriculture upon all Americans
- describe the agricultural community in the United States
- assess the level of agricultural literacy in the United States
- use a variety of means including writing, radio, and video to inform the public about agricultural information
- develop public relations campaigns to promote agriculture

Agricultural Publications

- write feature articles about agricultural topics
- sell advertisements to agricultural firms
- take photographs of agricultural subjects
- design layouts for advertisements
- use desktop publishing techniques and equipment

Communicating Ag to Public (International)

- describe the role agriculture plays in international relations
- discuss the cultural impact of agricultural trade
- list the barriers that exist when communicating agricultural information in international situations

History and Principles

- discuss the historical evolution of agricultural communications as a discipline and profession
- contrast the uniqueness of agricultural communications to other types of communications
- describe the purposes of agricultural communications
- apply techniques of agricultural communications

Agricultural Economics

Marketing

- discuss the definition and types of agribusiness marketing
- describe marketing theories related to price, grading, elasticity, etc.
- describe principles of hedging and futures contracts

Ag Policy

- discuss the impact of government and legislative policy upon agriculture
- describe the purposes of and rationale for farm programs
- evaluate the effectiveness of U.S. agricultural policy in foreign markets

Macro Economics

- describe the impact of monetary and fiscal policy
- discuss the factors that stimulate and inhibit economic growth

Ag Finance

- define and compare the sources of credit for agricultural institutions
- apply basic principles, tools, and techniques of financial analysis
- complete common forms used in financial analysis and credit institutions
- describe the concepts used to make financial decisions

Agribusiness Management

- describe the impacts of business people and agribusinesses upon consumers
- discuss the unique nature of agriculture and agribusiness in regard to methods of management, risk, diversity, types of firms, and seasonal nature
- describe the impact of government upon agribusiness

Micro Economics

- describe and apply concepts of indifference curves, supply/demand, and production function
- discuss the causes of price movements
- summarize the impacts of agricultural products and agricultural markets upon agricultural businesses

Agricultural Leadership

Ethics

- list the stages of moral and ethical development
- describe the impact of ethics upon personal development and human interaction
- apply ethical standards to decision-making

Interpersonal Relations

- describe the characteristics upon which interpersonal relationships are built
- list the traits of leaders desired by followers
- work with diverse groups
- demonstrate creative problem solving
- describe ways to influence and motivate other people
- apply leadership theories and styles

Organizational Dynamics

- describe the stages of group development
- develop a doctrine, leadership unit, program, and evaluation system for an organization
- apply methods of conflict resolution and group decision making
- evaluate the performance of co-workers

Personal Development

- make an honest assessment of personal character
- develop and use a personal mission statement
- apply principles of time management and personal planning
- demonstrate technical and cognitive skills needed by leaders

Figure 2. Disciplines, Competencies, and Objectives for Agriculture Core Area.

Agronomy

Crop Production and Management

- describe major world food and fiber crops including were they are produced and their uses
- demonstrate an understanding of plant growth and development
- discuss methods of crop management to maximize profit and minimize inputs
- describe soil principles including fertility water management
- list and describe management techniques for major pests of crops such as weeds, insects and disease
- discuss ways of producing crops in an environmentally conscious way

Animal Science

Livestock Production and Management

- describe the dynamics of agricultural animal production including nutrition, growth and development, reproduction, and genetics
- discuss characteristics unique to animal products and their related industries
- analyze public perception of animal food issues
- summarize the economic and management roles of producing agricultural animals
- report on the impact of biotechnology in agricultural animals

Environmental Sciences

Conservation

- define conservation
- discuss the ways in which humans impact the ecosystem and methods of making it stable
- define sustainability and common methods of sustainable agriculture production
- discuss environmental/global issues such as global warming and desertification and the relationship of agriculture with those issues
- describe the effects of agriculture upon erosion and the introduction of chemical compounds in the environment

Ecology

- define ecology and related terms
- describe the functions of the ecosystem
- summarize the ways in which organisms relate to their environment
- discuss theories of environmentalism including preservationist, animal rights, animal welfare, explotationist, agriculturist, conservationist

Food Science/Technology

Food Safety

- describe the basics of food classification, modern processing and quality/safety control

Internship Experience

Application of Ag Communications Concepts

- demonstrate the use of agricultural communications skills
- gain experience in the application of agricultural communications theories in the work place

Development of Personal Skills

- demonstrate the characteristics of responsibility and credibility
- master skills to complete given tasks
- communicate effectively in verbal and written forms
- model proficiency in time management and organization
- demonstrate self discipline and commitment

Development of Interpersonal Skills

- show ability to work as a team member
- apply the use of job protocol and the ability to take directions
- demonstrate loyalty, reliability and trust

Problem Solving Ability

- apply learned technical skills and personal experience to solve problems in the work-place
- demonstrate human relations skills in communicating ideas

Employee Responsibilities

- model professionalism
- make positive contributions to the firm
- present personal impressions of the internship experience to an advisory committee

Figure 2. Disciplines, Competencies, and Objectives for Agriculture Core Area (continued).

Note: Disciplines are shown in **bold** type, Competencies are shown in *italic* type, and Objectives are denoted with bullets (■).

Advertising

Creative Strategies
- display proficiency in copy layout, typography and production
- apply methods of design in an innovative way

Media Planning
- list the types of media used in advertising
- discuss ways to purchase advertisements in various types of media

Campaign Planning
- design a complete advertising campaign for a product
- apply a multitude of approaches to promote a product

Graphic Design
- develop graphic designs for the purpose of advertising products in various media
- use computer hardware and software to develop graphic designs

Journalism

News Writing
- use basic news style in writing
- describe in a clear and concise way, the principles of journalism

Reporting
- apply reporting and writing skills in a "real world" situation
- describe the ethical challenges faced by reporters
- interview a source of information for a news article

Editing
- edit the work of others
- use correct editing marks and symbols
- critique and correct layout and design of publications

Ethics in Journalism
- describe common dilemmas faced by journalists
- discuss the ethical standards that exist in the field of journalism
- determine ethical solutions to problems

Design and Layout of Publications
- describe and apply principles of design used in print media
- develop creative ways to present information in print

Dissemination Systems
- describe the ways in which news and other information is disseminated to the public
- compare the effectiveness of various dissemination systems for different messages and different audiences

Mass Communications Law
- discuss legal problems facing journalists, broadcasters and advertisers
- discuss and define communications regulations, fairness doctrine, libel, privacy and commercial speech

Photography

Composition
- define and discuss the relationships of line, shape, texture, pattern, unity, variety, balance, emphasis, rhythm, scale, and symbolism
- describe color associations
- determine appropriate light for types of films
- discuss types of lighting

Camera Functions
- discuss theory of light and cameras
- demonstrate proper camera care
- determine the appropriate camera and film for different purposes
- demonstrate the proper use of camera equipment including filters, films, flashes, lens, and other accessories.

Ethics in Photography
- discuss the ethical considerations of taking and using photographs
- describe the ethical considerations of controlling the scene and manipulating the subject
- discuss the influence of image seen on television and in magazines
- establish personal ethics for making and using images

Printing
- apply basic concepts of black and white as well as color film processing and printing
- control contrast in black and white and color prints
- describe concepts of how an image is reproduced in a magazine

Public Relations

Campaign Planning
- apply effective writing techniques
- identify needs and traits of the audience
- identify characteristics of the subject
- describe basic principles of public relations

Problem Solving
- determine problems and methods used to solve them
- solve public relations problems from case studies
- work individually and in groups to solve public relations problems

Personnel Management
- apply administrative theories to personnel relations

Figure 3. Disciplines, Competencies, and Objectives for Communications Core Area

Public Speaking

Speech Writing

- select appropriate topics
- write using effective formats and formulas
- use creative skills to develop introductions to effectively engage an audience
- customize a speech for a specific audience

Oral Communications

- apply effective speaking techniques
- use the voice to maintain the interest of an audience
- use a variety of inflection, tone, and volume

Nonverbal Communications

- use appropriate hand gestures in speaking
- use appropriate facial gestures in speaking

Telecommunications

Script Writing

- create media program formats that meet specific training, promotion, marketing, advocacy, fund raising, and orientation objectives
- apply writing and style techniques used in script writing

Broadcasting

- write information to be communicated via broadcast
- use appropriate verbal and audio techniques to present an effective radio broadcast
- use appropriate verbal and visual techniques to present an effective video broadcast

Video/Television Production

- describe budgeting, administration, and supervisory tasks associated with video production
- develop the ability to interpret concepts and ideas visually
- demonstrate a working knowledge of the technical aspects of the equipment used in video production
- perform the roles of camera operator, floor manager, technical director, projectionist, audio engineer, character generator operator, and prompter operator in a video production

Radio Production

- describe understanding of basic audio theory
- discuss the equipment used in audio production
- apply techniques in producing various audio program material
- demonstrate an understanding of multi-track recording
- write basic broadcast copy material

Figure 3. Disciplines, Competencies, and Objectives for Communications Core Area (continued).

Note: Disciplines are shown in **bold** type, Competencies are shown in *italic* type, and Objectives are denoted with bullets (■).

English

Grammar

- write with proper subject-verb agreement
- use proper punctuation and sentence patterns
- use basic principles of relationships of words
- develop awareness of common errors in grammar

Technical Writing

- prepare written work for professional use such as reports, manuals, business letters, etc.
- apply basic grammar and writing skills

Creative Writing

- apply basic techniques of poetry and fiction writing
- analyze and constructively critique poetry and fiction writing
- apply time saving techniques in writing

Government/Political Science

Government Policy

- describe the American political system
- recognize actors and institutions involved in the American political system such as political parties, levels of government, branches of government
- analyze and critique the American political system

Political Analysis

- use social science and political variables in everyday conversation
- conduct basic research arguing and analyzing how politics work in the American system

Legislation

- describe the legislative process
- describe ways to access legislators

History

American Agriculture

- summarize the development of American agriculture in the twentieth century
- evaluate the development of American agriculture through technological changes
- describe the rise of agri-businesses

American History

- describe the ideas, actions and themes that have impacted American history
- describe political, economical and social factors of Americans in the historical past
- describe an overview of the American heritage

Figure 4. Disciplines, Competencies, and Objectives for General Education Core Area .

World History

- describe the development of Western civilization
- recognize and appreciate art from various time periods
- compare different cultures and the influence of each upon modern society
- describe the influence of religions, agriculture, government, and other factors upon historical development

International Relations

Foreign Cultures

- describe the historical development of international cultures
- identify cultural characteristics that impact international relations

Trade Relations

- analyze the trade relations that exist between the United States and other nations
- identify barriers and opportunities for international trade of agricultural commodities

Cultural Differences

- differentiate cultures of other nations to that of the United States
- determine ways to work with people from other cultures

Communication Systems

- discuss the communications technology and systems that exist in other countries
- identify ways to communicate effectively in other nations

Political Constraints

- identify the governmental systems
- analyze political relationship between the U.S. and other nations

Economics

- evaluate the economic systems of nations
- assess impact of international relationships upon the economic systems of nations

Mathematics

Statistics

- use appropriate methods to analyze data
- apply different statistical concepts
- use formulas and procedures to calculate statistics

Algebra

- manipulate equations
- graph and/or geographically represent functions
- describe properties of exponents and logarithms
- solve matrixes and utilize them in applied functions
- solve sequences and series and apply them to practical use

Biological Sciences

Botany

- describe plant-environment interactions
- identify types of plants
- describe genetic make-up of plants
- identify diseased or distressed plants

Zoology

- describe animal-environment interactions
- describe the basic functions of animals and animal structures
- identify animals common to the local area

Biochemistry

- obtain molecular description of molecular materials, biological materials, and systems
- apply molecular approach to biochemistry systems

Physical Sciences

Geography

- identify the location of the nations of the world
- locate major land masses and bodies of water
- describe the topography of various regions of the world

Chemistry

- apply basic principles of chemistry
- describe the safety and long term impacts of the use of chemicals
- describe the impact of chemical use on the environment

Psychology

Individual Behavior

- define the field of psychology in a general way
- describe how psychology impacts the general public and how it helps people cope with everyday life
- apply principles of psychology to maintain mental health

Group Behavior

- describe the interaction between people
- determine the roles of individuals interacting in groups and how those roles are carried outside the group

Sociology

- describe the basic concepts, principles, theories, literature and research methods that constitute the field
- describe linkages between the lives of individuals
- analyze social processes in various contexts
- describe the role of social research for evaluating social problems and making public policy decisions

Business

General Concepts and Principles

- identify the types of business structures and how they operate
- describe the issues and problems that impact businesses and how they effect the general population

Figure 4. Disciplines, Competencies, and Objectives for General Education Core Area.

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Marketing

Marketing Principles

- identify marketing structures and agencies
- describe the basic ideas of consumer choice and preference
- identify the types of middlemen who operate between the producer of a product and the consumer

Product Promotion

- determine how to make consumers aware of a product and interested in buying it
- discuss the relationship between advertising, personal selling, and sales promotion

Buyer Behavior

- list factors of consumer decision-making
- describe behavior research techniques used in marketing
- discuss the process that a buyer goes through when committing to a purchase

Computer Applications

Desktop Publishing

- apply principles of layout and design
- demonstrate proficiency in the use of desktop publishing software to produce a publication

Word Processing

- create and edit documents
- manipulate and format documents

Presentation Graphics

- design and produce slides, transparencies and hard copy of information to be used in a presentation
- transfer information from documents and enhance its visual effectiveness using presentation graphics software

Graphic Design

- use the computer as a tool to design and/or manipulate graphics
- export computer-designed graphics to a desktop publishing program

Electronic Communications/Networking

- demonstrate the ability to transfer information via electronic media
- access and down-load information through computer networks

Database Management

- design and enter data into a database
- use a database program to access information and develop reports

Spreadsheet Development

- enter data and calculate statistics using a spreadsheet
- develop data graphs and charts with a spreadsheet program

Figure 4. Disciplines, Competencies, and Objectives for General Education Core Area (continued).

Note: Disciplines are shown in **bold** type, Competencies are shown in *italic* type, and Objectives are denoted with bullets (■).

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

1. The data collected by Bailey-Evans (1994) and supplemented through this research were organized into a model based upon core areas. For each core area, there were a set of disciplines. For each discipline, there were competencies, and for each competency, there were instructional objectives.

2. While the disciplines identified in the study conducted by Bailey-Evans (1994) were diverse, it was possible to cluster them into three distinct core areas: Agriculture, Communications, and General Education.

3. No attempt was made to cluster disciplines, competencies and objectives into "courses." Such effort would be futile because of the differences in university and college requirements among institutions. In some cases, disciplines might be combined to form a course. In other cases, an entire course might be built upon a single competency.

Recommendations

1. Input for the conclusions reached in this study was obtained from representatives of various careers in agricultural communications, administrators, academic advisors, and students. Based upon this fact, disciplines, competencies and instructional objectives included in this model should be used to develop new and enhance existing undergraduate programs in agricultural communications to ensure students will be best prepared to enter the work-force in this area.

2. Because of the number of diverse disciplines identified in this research, the curriculum for undergraduate programs in agricultural communications should include a wide range of subjects in agriculture, communications and general education.

3. The data presented in this study provide valuable information for the development and enhancement of specific courses for agricultural communications programs. A set of courses should be structured to provide opportunities for students to learn the competencies that best prepare them for their selected career.

4. Academic advisors for agricultural communications programs should use these data to determine if the courses and other experiences offered through their programs are providing students with competencies necessary to be best prepared for careers in this field.

5. The researchers recognize it would be impossible to complete each instructional objective contained in this research in a typical four-year bachelor's degree program. Therefore, agricultural communications curricula should be flexible with opportunities for students to specialize in specific areas of agriculture and communications in their upper division course work.

6. It is logical to think there might be some principles inherent to all careers related to agricultural communications. Therefore, future research should be conducted to identify a focused core curriculum to be the basis of agricultural communications degree programs.

7. Because of the rapid developments of communications technologies and agricultural sciences, job market analysis for agricultural communications careers should be conducted periodically and compared to the educational opportunities provided for students in curricular and extracurricular activities in the degree program.

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COMPETENCIES NEEDED FOR GRADUATES OF AGRICULTURAL COMMUNICATIONS PROGRAMS

by

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INTRODUCTION AND THEORETICAL FRAMEWORK

The discipline of agricultural communications has become an important part of achieving the mission of agricultural education to provide education in and about agriculture. Mass media and other "non-formal" methods of dissemination are valuable sources of information about many subjects, including agriculture. The audience of the popular press, television, and radio far exceeds the scope of influence of formal educational programs on the elementary, secondary, post-secondary and adult levels.

Preparation for professions to work in this field began in the early 1900s. According to Duley, Jensen and O'Brien (1984), the recognition of agricultural journalism at the university level was initiated when colleges of agriculture developed an extension function in the early decades of the twentieth century. Since that time, programs have evolved as agriculture and communication technologies have developed. Doerfert and Cepica (1990) reported there were more than 30 academic programs for agricultural communications or agricultural journalism in the United States. The vast majority of those programs were housed in colleges of agriculture and many share an administrative home with agricultural education.

Agricultural communications programs have been designed to fulfill two primary needs of graduates: 1) provide a strong basis of both technical agriculture and sources for agricultural information, and, 2) introduce methods of journalistic writing and other communications skills. According to Evans and Bolick (1982), agricultural communications graduates are taught to disseminate agricultural information to agricultural and non-agricultural audiences through various media. With that idea in mind, it should be recognized that the curriculum for agricultural communications programs is intended to help graduates qualify for a wide range of job opportunities available in the career field (Evans & Bolick, 1982).

Ten years ago, Souka (1985) and Dillman (1985) recognized that changes in both fields of communications and agriculture created a need for agricultural communications faculty to examine their curricula. Although an in-depth assessment of present curricular offerings is a necessary base for curricular revision (Nash, 1928; Kroupa & Evans, 1976; Larson & Hoiberg, 1987; Sledge, 1987), only a few detailed studies of agricultural communications curricula exist (Duncan, 1957; Evans & Bolick, 1982).

Who should provide input as to what should be included in the agricultural communications curriculum? Paulson and Metzger (1990) stated if academic curriculum is to meet the needs of the industry, agricultural communications programs must continually survey professionals to determine the needs and skills required for a career in agricultural communications. Flatt (1991) said those involved in the curriculum review process should also include students in the program, graduates of the program, instructors, college administrators, and employers. However, since 1905, when the first curriculum in agricultural communications was established, there has been no formal assessment conducted in order to determine what disciplines and competencies are need for graduates of agricultural communications programs based upon the opinions of representatives named above (Bailey-Evans, 1994).

PURPOSES AND OBJECTIVES

The purpose of this research was to determine the competencies needed for graduates of agricultural communications programs using input from leaders in agricultural communications representing professionals in the fields related to agricultural communications, instructors and administrators of academic programs, graduates of academic programs, and students studying agricultural communications. The following objectives were developed to accomplish the purpose:

1. Develop a profile of leaders of selected professional organizations in agricultural communications.
2. Determine the discipline areas students should pursue to prepare them for careers in agricultural communication.
3. Identify competencies agricultural communications graduates should possess.

METHODS AND PROCEDURES

The study utilized a three-round, modified Delphi technique to reach consensus from a panel of experts based on multiple responses. The panel of experts was comprised of agricultural communications leaders from the seven major agricultural communications professional organizations in the United States. The seven selected agricultural communications-related professional organizations were:

- Agricultural Communicators of Tomorrow (ACT)
- Agricultural Communicators in Education (ACE)
- Agricultural Relations Council (ARC)
- American Agricultural Editors' Association (AAEA)
- Cooperative Communicators Association (CCA)
- Livestock Publications Council (LPC)
- National Association of Farm Broadcasters (NAFB)

Using the 1993 member directory for each organization, the researchers selected 80 individuals to participate in the study. The individuals were selected from 1993 national officers, trustees, or directors for each of the seven organizations. The ACT group included student officers as well as faculty advisors.

All of the individuals listed were contacted by telephone and asked to participate. Two individuals were unable or unwilling to take part in the study, so two people involved in leadership position in their respective organizations were asked to take their place. The 80 individuals represented agricultural communications employers, employees, educators and students.

Instrumentation

The instruments utilized in the study were developed by the researchers. An in-depth review of literature was conducted to develop a list of curriculum disciplines to be included in the Round I instrument. A panel of experts comprised of research graduate assistants, faculty members and communication specialists from agricultural education and agricultural communications programs at two universities assisted in selecting the content and designing the format of the first-round instrument.

The instrument for Round I was pilot tested with upper-level undergraduate students, graduate students, recent graduates, and agricultural communications professionals in two states. A faculty advisory group from the institutions also reviewed the Round I instrument and suggested changes in content and question clarity prior to mailing.

The Round I instrument consisted of two primary sections. The first section was designed to collect demographic data from the participants in the study. The second section was comprised of a list of 38 curriculum discipline areas. A four-point Likert-type scale was used to indicate agreement for items to be included in the list of disciplines. The scale was composed of the following response choices: Strongly Agree; Agree; Disagree; Strongly Disagree. Space was provided on the instrument for respondents to add additional disciplines and to rate the value of these additions. Respondents were also asked to contribute specific competencies for each of the discipline areas.

The instrument for the second round was developed using data collected in Round I. Only those items receiving a rating of "Strongly Agree" or "Agree" by at least 70% of the respondents were included in the Round II instrument. The mean rating for each discipline taken from Round I was printed next to each. Respondents were asked to rate the disciplines again, using the same scale used in Round I. In addition, a group of curriculum competencies were listed below each of the discipline areas. These items also offered the same Likert-type response choices described in Round I. Space was provided for the respondents to add additional competencies for each of the discipline areas and to rate the value of each.

The Round III instrument was designed to collect the respondents' final opinions regarding the disciplines and competencies needed for agricultural communications graduates. The same discipline areas and competencies rated and identified in Round II were listed. The percent of respondents who marked "Strongly Agree" or "Agree" for each item in Round II was listed in parentheses beside each discipline area and competency. Items to be cut as a result of not making the 70% cut line from Round II were displayed with a strikethru (~~strikethru~~) style. The respondents were asked to indicate if they disagreed with the status of an item (whether it was to be retained or cut). Respondents were asked to explain the rationale for their disagreement.

Collection of Data

All 80 panel members were contacted by phone prior to the first mail-out to introduce the objectives of the project and obtain their consent to participate in all three rounds. Each individual was also notified that he or she would be receiving the first-round survey in 2-3 weeks after the phone conversation.

Round I of the survey was mailed on October 6, 1993 and was due on October 18, 1993. Phone calls and reminder cards were used to enhance response rate. All 80 of the panel members responded to Round I.

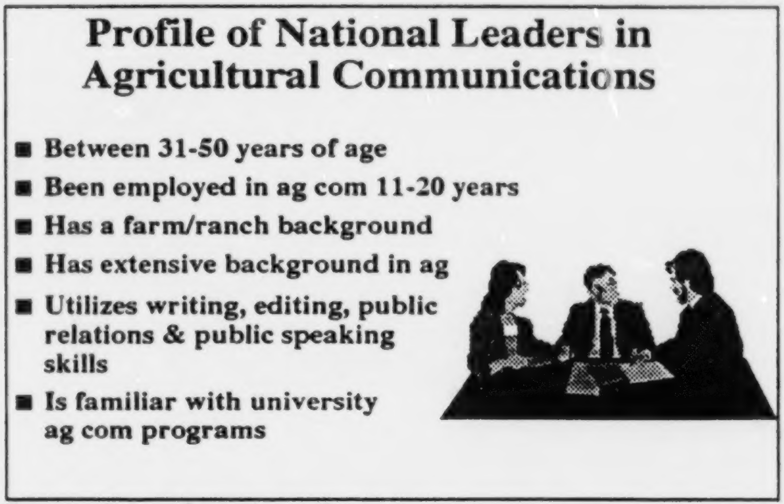
Round II was mailed on November 8, 1993, with a due date of November 25, 1993. The same follow-up procedures used in Round I were utilized. Two panel members failed to respond, resulting in a 96% response rate for Round II.

Round III was mailed to the 78 remaining participants on January 4, 1994, and was due by January 18, 1994. An ink pen was sent to each individual along with the instrument as a means of thanking the individuals for their participation. Similar follow-up procedures used in Rounds I & II were utilized. Seventy-two instruments were returned, representing a 93% response rate for Round III. One instrument was unusable. The overall usable response rate for the study was 89%.

RESULTS

Profile of Leaders in Agricultural Communications

Figure 1 shows the personal and professional characteristics of panel members who participated in the study. Thirty-five percent were 31-40 years old, and the same number were aged 41-50. Five percent were 60 or older, and 11.3% were 51-60 years of age. Nearly 13% were 20-30 years old. Seventy percent of the panel had been employed in agricultural communications for more than 11 years. Nearly one-half had been employed in the field for 11-20 years. Slightly less than eight percent had been employed for more than 30 years.



Profile of National Leaders in Agricultural Communications

- **Between 31-50 years of age**
- **Been employed in ag com 11-20 years**
- **Has a farm/ranch background**
- **Has extensive background in ag**
- **Utilizes writing, editing, public relations & public speaking skills**
- **Is familiar with university ag com programs**

Figure 1. Characteristics of panel members

Slightly more than 51% of the panel members had grown up on a farm or ranch. More than one-fifth grew up in a small town. Very few considered their home to be a large town (11.3%), a city (7.5%), or a metropolitan area (2.5%). Most of the panel members (83.7%) had some background in agriculture prior to entering the agricultural communications field. One-third had moderate experience and 45% had extensive experience in agriculture prior to entering agricultural communications.

More than 85% of the panel members had completed a bachelor's degree or higher. Twenty-five percent had completed a master's, and 10% had completed a doctorate. Over 90% of the panel members were familiar with agricultural communications programs in colleges and universities. Slightly less than half (43.8%) of the panel members had completed an internship program while in college.

Respondents were asked about the type of work they do. Panel members indicated the most frequently used skills needed to complete their current work related duties were writing (97.5%), editing (95.0%), public relations (85.0%), and public speaking (80.0%).

Disciplines

An extensive review of literature that included curriculum evaluation studies, university catalogs, and course syllabi yielded a list of prospective discipline areas in which graduates of agricultural communications programs should be proficient. This list was supplemented by panel members during Round I of this study. Table 1 displays each of the discipline areas evaluated and the final rating of each.

English was the highest rated discipline area (97.3%) followed closely by Public Relations (96.1%) and Public Speaking (96.0%). More than 90% of the panel members strongly agreed or agreed agricultural communications graduates should be proficient in Journalism, Agricultural Communications, Computer Applications, Internship Experience, and Photography.

The highest rated disciplines from agriculture were Agricultural Economics with 89.5% and Agricultural Leadership with 86.8% of the panelists marking at least "agree." More than three-fourths of the respondents agreed that Agronomy (79.0%) and Animal Science (77.6%) should be included among the discipline areas of proficiency.

There were 14 discipline areas in which less than 70% of the panel members marked "agree" or "strongly agree." Some of the items included in this group were Management (69.8%), Mass Communications (67.1%), and Agricultural Education (57.5%). Health and Physical Fitness (41.3%), Landscape Architecture (37.5%), and Home Economics (22.6%) received the lowest ratings.

Concepts

Identification of discipline areas provided input concerning broad areas of proficiency needed by graduates of agricultural communications programs. In rounds two and three of the research, a series (one or more) of specific concepts was added to each discipline area to further identify areas in which graduates need to be knowledgeable.

Table 2 displays the concept areas within each discipline along with the percent of panel members who rated each area "strongly agree" or "agree." As with the discipline areas, all concepts with less than 70% agreement were excluded from on the list of recommendations.

Table 1

Rating of Discipline Areas Necessary for Graduates of Agricultural Communications Programs

Discipline Area	Percent[a]
English	97.3
Public Relations	96.1
Public Speaking	96.0
Advertising	93.4
Journalism	93.4
Agricultural Communications	92.2
Computer Applications	90.8
Internship Experience	90.8
Photography	89.5
Telecommunications	89.5
Agricultural Economics	89.5
Government/Political Science	89.4
Biological Sciences	88.1
Agricultural Leadership	86.8
History	81.6
Environmental Science	80.2
Business	80.2
Psychology	79.0
Agronomy	79.0
Sociology	78.9
Marketing	78.9
Mathematics	77.6
Physical Sciences	77.6
Animal Science	77.6
International Relations	77.6
Food Sciences Technology	71.1
Management	69.8[b]
Humanities/Fine Arts	67.1[b]
Mass Communications	67.1[b]
Entomology	66.3[b]
Foreign Language	63.8[b]
Horticulture	63.8[b]
Agricultural Education	57.5[b]
Forestry	53.8[b]
Fisheries/Aquaculture	51.3[b]
Computer Science	47.6[b]
Agricultural Engineering/Mechanics	42.6[b]
Health/Physical Fitness	41.3[b]
Landscape Architecture	37.5[b]
Home Economics	22.6[b]

[a] Percent = percentage of respondents who marked "strongly agree" or "agree" for each item.

[b] Items with less than 70% were excluded from list of recommendations.

Table 2

Rating of Concepts Necessary for Graduates of Agricultural Communications Programs

Concept	%[a]
English	
Grammar	100.0
Creative Writing	88.2
Technical Writing	94.7
Literature	64.4[b]
Government/Political Science	
Government Policy	94.7
Legislation	84.2
Political Analysis	82.9
Local Government	63.2[b]
Fiscal Administration	53.9[b]
Political Parties	52.6[b]
History	
American Agriculture	96.0
American History	92.1
World History	71.0
State History	60.5[b]
Western Civilization	57.9[b]
International Relations	
Trade Relations	80.2
Cultural Differences	79.0
Communication Systems	76.3
Economics	75.0
Political Restraints	75.0
Mathematics	
Statistics	85.5
Algebra	71.0
Geometry	51.4[b]
Trigonometry	28.9[b]
Biological Sciences	
Botany	80.2
Zoology	76.3
Biochemistry	71.0
Physical Sciences	
Geography	85.6
Chemistry	72.4
Atmospheric Sciences	68.4[b]
Geology	54.2[b]
Physics	43.5[b]
Psychology	
Individual Behavior	77.6
Personality Structures	57.9[b]

Concept	%[a]
Sociology	
Group Behavior	73.7
Social Institutions	67.1[b]
Social Interactions	67.1[b]
Cultural Development	64.5[b]
Business	
General Concepts and Principles	71.0
Ethics	68.5[b]
Administration	61.8[b]
Accounting	60.5[b]
Roles and Functions	57.9[b]
Marketing	
Marketing Principles	80.2
Product Promotion	75.0
Buyer Behavior	72.4
Distribution Systems	65.7[b]
Retail Systems	64.5[b]
Advertising	
Creative Strategies	94.8
Media Planning	92.1
Campaign Planning	89.5
Graphic Design	88.1
Budgeting	85.5
Journalism	
News Writing	98.6
Reporting	98.7
Editing	97.4
Ethics in Journalism	93.5
Design and Layout	92.1
Dissemination Systems	88.2
Photography	
Composition	92.1
Camera Functions	85.6
Ethics in Photography	73.7
Printing	72.4
Developing	69.7[b]
Public Relations	
Campaign Planning	96.0
Problem Solving	93.4
Personnel Management	84.2
Public Administration	67.1[b]

Table 2
Rating of Concepts Necessary for Graduates of Agricultural Communications Programs (continued)

Concept	%[a]
Public Speaking	
Oral Communications	97.4
Speech Writing	97.3
Nonverbal Communications	79.0
Telecommunications	
Script Writing	93.4
Broadcasting	92.1
Video Production	89.5
Radio Production	88.1
Television Production	86.8
Agricultural Communications	
Communicating Agriculture to Public (Domestic)	93.4
Agricultural Publications	90.8
Communicating Agriculture to Public (International)	89.4
History and Principles	84.3
Agricultural Economics	
Marketing	92.1
Agricultural Policy	90.8
Macro Economics	80.3
Agricultural Finance	77.6
Agribusiness Management	76.3
Micro Economics	73.7
Farm and Ranch Management	65.8[b]
Agricultural Leadership	
Ethics	81.6
Interpersonal Relations	80.3
Organizational Dynamics	77.6
Personal Development	75.0
Multicultural Relations	69.8[b]
Styles and Theories	67.1[b]

Concept	%[a]
Agronomy	
Crop Production and Management	80.3
Soil Science	63.2[b]
Breeding/Genetics	63.1[b]
Plant Physiology	63.1[b]
Animal Science	
Livestock Production and Management	82.8
Reproduction/Genetics	64.5[b]
Livestock Selection	61.8[b]
Applied Nutrition	60.6[b]
Anatomy/Physiology	59.2[b]
Environmental Sciences	
Conservation	85.5
Ecology	82.9
Range Management	60.6[b]
Wildlife Management	60.6[b]
Food Science/Technology	
Food Safety	77.6
Processing	59.2[b]
Food Analysis	48.7[b]
Computer Applications	
Desktop Publishing	100.0
Word Processing	98.6
Presentation Graphics	92.1
Graphic Design	89.5
Electronic Communications/Networking	88.2
Database Management	82.8
Spreadsheet Development	73.7
Internship Experience	
Application of Agricultural Communications Concepts	92.1
Personal/Interpersonal Skills Development	90.8
Problem Solving	85.5
Employee Responsibilities	84.2

[a] % = percentage of respondents who marked "strongly agree" or "agree" for each item.
[b] Items with less than 70% were excluded from list of recommendations.

The panelists unanimously agreed graduates need to have knowledge about two competency areas: Grammar and Desktop Publishing. More than 95% agreement was reached on seven more items with News Writing (98.6%), Reporting (98.7%), and Editing (97.4%) all being related to the discipline area Journalism. Oral Communications (97.4%), Speech Writing (97.3%), Public Relations Campaign Planning (96.0%), and History of American Agriculture(96.0%) were also rated very high.

The disciplines with the greatest number of concepts approved were Computer Applications (7), Agricultural Economics (6), Journalism (6), Advertising (5), International Relations (5), and Telecommunications (5). Four concepts were identified with in the areas of Photography, Agricultural Communications, and Internship Experience. In all, 83 concepts were identified as important for agricultural communications graduates to know about.

Thirty-seven concepts were eliminated for lack of agreement among panel members. This group included, but was not limited to Literature (64.4%), History of Western Civilization (57.9%), Trigonometry (28.9%), Physics (43.5%), Leadership Styles and Theories (67.1%), Plant Physiology (63.1%), Animal Anatomy and Physiology (59.2%), Wildlife Management (60.6%), and Food Analysis (48.7%).

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

1. Leaders in agricultural communications are diverse in age and have more than ten years of professional experience. Most tend to have an extensive background in agriculture and use a variety of communications skills in their work.
2. The panel of leaders identified 26 discipline areas and 83 concepts as important for graduates of agricultural communications degree programs. These areas include a wide range of topics at varying depths of knowledge.
3. Agricultural communicators need to have competency in discipline areas related to general studies, communications, and agriculture.
4. As indicated by the high level of agreement in the areas of English and journalism, the panelists believe writing skills are extremely important for graduates of agricultural communications programs.
5. Business, including marketing and agricultural economics, are important areas of knowledge for agricultural communications graduates.
6. Agricultural communications was identified as a unique discipline with its own set of concepts. It is not a sub-group of agriculture or communications.
7. Graduates of agricultural communications need to be skilled in operating microcomputers to accomplish a variety of tasks including desktop publishing, word processing, graphical design, networking, and management.

8. Internship experiences are a valuable and important part of the educational training of agricultural communications professionals.

Recommendations

1 The list of disciplines and competencies which received a 70% agreement rating ("Strongly Agree," "Agree") should be used by universities to develop or enhance their agricultural communications curriculum.

2. A large number and variety of disciplines and concepts were identified through this research. While it may be impossible for every student to study each of these areas at the appropriate depth, it is important students be provided an introduction to the various areas of agriculture and communications identified here.

3. Considering the diversity of skills required of leaders in agricultural communications and the fact that 25 concepts related to communications were identified by the panelists, emphasis should placed upon providing students with information and experiences about a variety of areas in communications.

4. Agricultural communications programs should attempt to provide students with opportunities to pursue studies in the identified disciplines and concept areas and remain as flexible and diverse as possible. Students should be provided opportunities to generalize and specialize in specific areas of communications and agriculture based upon their interests and career aspirations.

5. Opportunities for internships should be provided for students who are pursuing agricultural communications as a career. Such experiences provide practical application of disciplines and concepts taught in courses.

6. Further research should be conducted to determine the depth at which the disciplines and concepts identified in this research should be studied.

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MATHEMATICAL PROBLEM-SOLVING PROFICIENCY OF AGRICULTURAL EDUCATION TEACHERS IN ALABAMA

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MATHEMATICAL PROBLEM-SOLVING PROFICIENCY OF AGRICULTURAL EDUCATION TEACHERS IN ALABAMA

INTRODUCTION AND THEORETICAL FRAMEWORK

There is a growing belief that vocational education should change from the present discipline form to one that coordinates with other disciplines. These changes are encouraged to produce a better trained work force and provide basic academic skills for greater student success in completing the requirements of higher education institutions.

Gray (1991) stated that if problems are not debated, and reform is not used to change and improve vocational education, it very well may cease to exist. The changing technology of business and industry creates a need for change in the educational process.

Vocational education must become aware of and adjust to this change in order to be an active part of the educational process of the future. Adapting to change by determining what must be done to reach the needs of future students and incorporating those needs into the goals of the discipline will strengthen and improve vocational education.

Over the last decade, there have been numerous reports that call for reform in vocational education. Recommendations regarding improvements in vocational education and, in particular, agricultural education have been made. These reports have recommended that (a) the role of vocational education should change to make youth more employable; (b) vocational education should complement academic education so that employability can best be accomplished; (c) academic and vocational education curricula should be integrated and their equal importance should be recognized by students, faculty, and administrators; and (d) students should be taught to see the connection between vocational subjects, academic subjects, and the skills needed to succeed in the vocation of their choice (Educational Testing Service, 1990; National Commission on Secondary Vocational Education, 1984; The Secretary's Commission on Achieving Necessary Skills, U.S. Department of Labor, 1991; William T Grant Foundation Commission on Work, Family and Citizenship, 1988).

In 1986, the Secretary's Commission on Achieving Necessary Skills (SCANS) (The Secretary's Commission on Achieving Necessary Skills, U.S. Department of Labor, 1991) report stated priority should be given to the integration of academic and vocational skills to improve the labor force. According to the SCANS report, all students should learn basic academic skills and be able to use them in a practical way to solve problem situations in the work place of the future. From this report, a trend developed giving emphasis to integration of vocational and academic skills (Warnat, 1991). This report also provided suggestions to schools for providing a well-rounded, practical, and functional education that produces a competent, productive worker, a successful post secondary student, and a functional, beneficial member of society.

The Perkins Act (The Carl D Perkins Vocational and Applied Technology Education Act, 1990) is the legislation that mandates the approach recommended by the SCANS report. The Perkins Act provides standards designed to ensure that all vocational educators will integrate mathematics and science into their teaching plan. The intention of this legislation is to provide direction and emphasis to state depart departments of education, local school systems, and local schools to produce those well rounded educated workers for the work force of tomorrow through the integration of academic and vocational training (Warnat, 1991). The suggestions from the SCANS report, which emphasized providing a competent future work force, are now mandated by the Perkins Act. The Perkins Act includes trend setting legislation that calls for educationally well-rounded students through a combination of vocational and academic training. This training should be provided by all faculty members through coordination of disciplines and not be fragmented, as has usually existed within schools and school systems.

The standards developed from the Perkins Act have prompted state departments of education and local school systems to begin developing curriculums to incorporate the standards into new formats for lesson plans. These lesson plans provide for integration of academic skills into the agricultural education curriculum (J.D. Kendricks, personal communication, October, 1993). In Alabama, the Performance Based Accreditation System (PBAS) has incorporated these new formats into the evaluation of vocational programs throughout the state (Alabama State Department of Education, Accreditation Division, 1993).

Vocational educators have recognized the importance of academic proficiency to vocational students (Miller & Gliem, 1993a). Much of the work in academic content within agricultural education has concerned mathematics and science proficiency. Science is closely related to much of the curriculum of agricultural education, and such work has been done in that area to incorporate these two subjects (Butler & Lee 1993; Dormody, 1992).

Mathematics is used in many of the content units of agricultural education, but it has not, at this point, received as such study and attention as science (Gliem & Persinger, 1987). Pritiz (1988) stated that employers expect their employees to apply basic mathematics skills as well as other skills to their everyday specific tasks.

Mitchell (1990) found that employment situations typically require practical problem solving in mathematics not taught in the current mathematics curriculum. D'Augustine (1989) stated that rapidly changing requirements are placing new demands on the mathematics skills of students entering majors in business and vocational programs. Mitchell's (1990) findings that employees must be competent in mathematics skills in order to survive the work place of the future, and D'Augustine's (1989) statement concerning the post secondary needs for mathematics, indicates that changes are needed in the educational process used to train the work force of the future, and to provide the basic academic skills needed for students to be successful at the post secondary level. Vocational education, particularly agricultural education, can play an important role in the future of education through the integrating of academic and vocational subjects.

Changes are needed not only in the mathematics classes, but in the general approach to teaching mathematics (Miller & Gliem, 1993b). Agriculture teachers can provide instruction in practical mathematics that will help students become more proficient in mathematics skills. The integration of academic content and curriculum into the vocational curriculum is necessary according to the new federal standards that are the result of the Perkins Act (Alabama State Department of Education, Vocational Division, 1993a).

Miller and Gliem (1993a) found that Ohio teachers participating in a workshop were strongly positive regarding including mathematics in the vocational curriculum. Miller and Vogelzang (1983) found that Iowa teachers support inclusion of mathematics into the agricultural education curriculum and stated that integration could be used as a means of improvement in agricultural education.

In Ohio, 27% of the agriculture teachers studied indicated mathematics teachers asked them for example of agricultural related mathematics problems to be used as a part of the academic curriculum. Forty-seven percent of these agriculture teachers stated they asked the mathematics teacher for assistance in ways to present mathematics problems in the agricultural education curriculum (Miller & Gliem, 1993a). Coordination of disciplines is important in the effort to produce competent, successful graduates.

In response to the Perkins Act, state departments of education have begun emphasizing the integration of academic subjects into the vocational curriculum and teachers must be the ones to carry out the process. Agriculture teachers must be effective in carrying out this responsibility and they must possess certain competencies that will enable them to incorporate and teach the application of academics, and in particular mathematics, into the agricultural education curriculum (Warnat, 1991).

With the influence of the Perkins Act, the general school curriculum will involve integration of all subjects into a whole person education Agricultural education must play a role in this process in order to survive changes the future will bring in the approach to education The ability of the vocational teacher to integrate academics, including mathematics, will determine the success of agriculture programs to a large degree. The Perkins Act will have an impact on all education programs for the next several years and vocational teachers, in particular agricultural teachers must be prepared (Warnat, 1991).

Statement of the Problem

Agriculture teachers in Alabama are required to teach and integrate mathematics skills into the agricultural education curriculum as required by the standards resulting from the Perkins Act. As it is required that integration take place and teachers will be evaluated, in part, on integration a problem exists as to whether teachers of agriculture possess the mathematical proficiency needed to integrate mathematics into their curriculums.

Applied academics, including programs for the integration of mathematics skills into the agricultural education curriculum, have been developed or used in very few agriculture programs. Approximately half of the teachers surveyed in Ohio were not coordinating their efforts with mathematics teachers (Miller & Gliem, 1993a). The Alabama State Department of Education has begun the Performance Based Evaluation System (PBES), and because this system has integration as one of its components, it is necessary for agriculture teachers in Alabama to be proficient in mathematics skills.

Purpose and Objectives

The purpose of this study was to determine whether agricultural education teachers in Alabama a have the mathematical skills to teach mathematics concepts as they relate to agricultural education. In addition, this study sought to determine if there is a relationship between the scores on a researcher-made mathematics test for agriculture teachers and the reported level of integration of mathematics in the agricultural units they teach.

To accomplish the purpose, the following research questions were investigated.

1. What is the mathematical problem-solving proficiency of agricultural education teachers in Alabama?

2. What is the self-reported level of integration of mathematical problem-solving skills into the agricultural education curriculum?

3. Do teachers with high levels of mathematical problem-solving proficiency report a different level of integration than teachers with low levels of mathematics problem--solving proficiency?

METHODS AND PROCEDURES

The design of the study was descriptive-correlational. Selected agricultural education teachers were given a teacher-made instrument designed to measure their mathematical problem-solving proficiency. They were also asked to complete a data sheet requesting demographic information and information regarding the level at which they integrated mathematics concepts into their curriculum during the previous school year.

Population and Sampling

The population for the study consisted of all 380 agricultural education teachers in Alabama for the 1993-94 school year as identified by the Alabama Agricultural Teachers Directory (Alabama State Department of Education, Vocational Division, 1993b). These teachers attend district planning and inservice meetings organized each quarter by the state department of education. Each meeting has the same agenda and provides the same information to the teachers. A total of 12 meetings are held each quarter. A cluster sample of two of these meetings were randomly chosen to provide the 55 participants of this study, with a third meeting chosen to provide the 18 participants for the pilot study. The members of these clusters were compared to the total population on demographics and found to be no different on 5 of the 6 variables. Therefore, the findings are generalized to the population (Borg & Gall, 1989).

Instrumentation

A researcher-made mathematics proficiency test for agriculture teachers was used to determine the mathematical problem-solving proficiency of Alabama agricultural education teachers. The instrument was developed using instruments from Miller and Gliem (1993a & 1993b) and from Gliem and Warmbrod (1986).

A panel of experts established the content validity of the instrument. The panel consisted of agricultural teacher educators and mathematics teachers. The panel determined that each of the 40 items on the test were of a level an agricultural education teacher should be able to answer correctly. Because the test was a speed and power test, a minimum proficiency of 85% was determined by the panel.

A pilot test was conducted to determine the reliability of the instrument. The instrument was given to 18 teachers attending the first of the three meetings randomly selected. The Cronbach's alpha for the instrument was .92. Individual item alphas were analyzed and it was determined that all items should remain in the final instrument.

The primary researcher attended the meeting and administered the instrument personally. Each teacher in attendance was given two minutes to complete the demographic data sheet and 30 minutes to complete the test. The participants turned the test and demographic data sheet into an envelope containing the same number as the test. No names were provided on either the test or demographic sheet. One teacher was late for the meeting and did not participate.

Data Collection

Teachers attending the two meetings selected were the participants in the study. A total of 55 teachers were scheduled to attend the two meetings. All 55 teachers attended and all 55 teachers completed the instrument. Data collection procedures were carried out identically to those used in the pilot test described above.

FINDINGS

Demographic information about the participants is provided below. Following, the findings are reported based on the research questions of the study.

Demographics Characteristics of Participants

The demographic data collected from this sample included age, gender, race, years of teaching experience, educational level, number of college mathematics course s taken, and type of school in which they taught. Additionally, teachers were asked for their perceptions regarding the following: where they learned most of their mathematics skills, whether it is necessary for agricultural education teachers to integrate mathematics into their curriculum, and the extent to which they integrate mathematics into their agricultural education curricula.

The sample ranged in age from 22 to 54 years. The mean age of the sample was 37.8 years, with a standard deviation of 7.84. They had been teaching agriculture for an average of 14.4 years.

Most of the participants in the two meetings were white, had degrees above the bachelors level, had taken two or more mathematics courses in college, and taught in a comprehensive high school. All participants were male. Table 1 contains a summary of these demographic variables.

Research Question 1

The first research question asked, "What is the mathematical problem-solving proficiency of agricultural education teachers in Alabama?" The mathematical problem-solving proficiency is one means of determining whether teachers have the ability to implement the mathematical integration required by state and federal standards. The participants scores ranged from a low of 4 (10% correct) to a high of 40 (100%). The mean percent correct was 66.16, indicating an average of 26 of 40 items answered correctly. The standard deviation was 20.09, with a raw score standard deviation of 8.0.

Table 1.

Summary of Demographic Variables (N = 55).

Variable	Frequency	Percent
Race		
White	53	96.4
African American	2	3.6
Total	55	100.0
Education		
Bachelors	15	27.3
Masters	21	38.2
AA Certification	19	34.5
Total	55	100.0
Number of College Math Courses		
One	13	23.6
Two	18	32.7
Three or more	24	43.7
Total	55	100.0
Type of School		
Junior High	1	1.8
Comprehensive High School	50	91.0
Vocational School or Center	4	7.2
Total	55	100.0

Research Question 2

The second research question asked, "What is the self-reported level of integration of mathematical problem-solving skills into the agricultural education curriculum?" Participants were asked to report the percentage of units taught during the previous school year in which they integrated mathematics concepts. The following scale was used in the question: 0-25% of the units; 26-50% of the units; 51-75% of the units; and 75-100% of the units. Over two-thirds (67.2%) of the participants indicated that they integrated mathematics into 50% or fewer of the units they taught. Teacher responses are summarized in Table 2.

Table 2.

Self-Reported Level of Mathematics Integration by Teachers (N = 55).

Integration Level	Frequency	Percent
0-25% of units integrated	17	30.9
26-50% of units integrated	20	36.4
51-75% of units integrated	11	20.0
76-100% of units integrated	7	12.7
Totals	55	100.0

Research Question 3

The third research question asked, "Do teachers with high levels of mathematical problem-solving proficiency report a different level of integration than teachers with low levels of mathematics problem-solving proficiency?" Before separating the sample into subgroups for the purpose of calculating a t-test on mean differences for high and low proficiency, a Spearman Rho test was calculated for the entire group to determine the extent of the relationship between proficiency score and integration rate. The Spearman Rho calculated was not significant ($r_s = .15$).

Comparison of Possible Extraneous Variables

Teachers' mathematical problem-solving proficiency and self-reported levels of integration were compared with five variables identified in the literature as possibly being related. The five variables were age, years of experience teaching agriculture, number of college math courses taken, educational level, and type of school. None of the variables were significantly related to mathematics problem-solving proficiency. Two variables, years of teaching experience ($r = .28$) and type of school taught in (Cramer's $v = .33$) were significantly related to self-reported level of integration.

CONCLUSIONS

The following conclusions and recommendations are based on the findings of this study.

1. The mathematical problem-solving proficiency of the majority of Alabama agricultural education teachers sampled is lower than the established proficiency as considered by the panel of teachers and teachers training staff that established content validity. The panel suggested a acceptable proficiency of 85%. The mean proficiency level was 66%.

2. The amount of integration of mathematics into the agricultural education curriculum was in the range of 26-50% of the total units that were taught by teachers.

3. According to the requirements of the Perkins Act, mathematics skills are required in 80-85% of the units for grades 9-12. For the Alabama PBES, the amount of mathematical integration is 80-85% for grades 7 and 8 also. The respondents were found to be integrating mathematics into 26-50% of the units they teach. The rate of integration found in this study will not meet the federal standards from the Perkins Act or those from the PBES.

4. Teachers within the sample that demonstrated a high mathematical problem-solving proficiency were not integrating mathematics into the curriculum at a significantly higher percentage than those that demonstrated a low level of mathematical problem-solving proficiency.

5. Those teachers with 15 or more years of experience teaching agriculture reported integrating mathematics into a higher percentage of the units they teach than do teachers with fewer years of experience teaching agriculture.

6. Those teachers who teach in an vocational school or center within agricultural education integrate mathematics into a higher percent of the total units they teach than those in the general agricultural curriculum.

7. The selected variables of age, number of mathematics courses, or educational level were not significantly related to the level of integration.

8. None of the selected variables of age, years of experience, number of mathematics courses in college, educational level, or type of school significantly influenced the problem-solving proficiency score of the group.

RECOMMENDATIONS

The following recommendations are based on the findings and conclusions of the report.

1. The Alabama State Department of Education may consider several ways to increase the mathematical problem solving proficiency of teachers as this study and related literature review found as proficient as the established standards. Some of the possible approaches include the following: (a) district and summer in-service workshops that

provide examples of mathematical problems related to agriculture; (by mail packets of supporting material that have examples of mathematical problems for different areas in agriculture; (c) a teachers reference or workbook manual of mathematical problems related to agricultural provided to each teacher, tabbed and indexed by subject, containing formulas and sample problems with illustrations that are related to the Alabama course of study and the PBES lesson plans; and (d) a developed format for PBES lesson plans which each teacher is to have as a part of their evaluation. This format could suggest Able skills in mathematics and provide examples to be taught in the lesson.

2. According to Gliem and Warmbrod (1986), agricultural education departments may consider attempting to integrate more practical mathematics applicable to agriculture into the present course work. Offering related math in classes such as agricultural mechanics and construction may refresh skills and improve the mathematical problem-solving proficiency of future teachers.

3. The Alabama State Department of Education, Vocational Division, may consider an emphasis on integration throughout the state and show the relationship integration has with successful PBES evaluations. Some of the possible ways to accomplish this are; (a) professional development at district meetings; (b) letters from district and state specialists to teachers giving emphasis on the need for integration; and (c) in-service professional development workshops planned by vocational directors for agriculture teachers.

4. Additional research is needed to determine why teachers who exhibit a high level of mathematics problem-solving proficiency do not utilize their skills to integrate more mathematical concepts into their curricula.

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LEARNING STYLES OF AGRICULTURAL EDUCATION PRE-SERVICE TEACHERS

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LEARNING STYLES OF AGRICULTURAL EDUCATION PRE-SERVICE TEACHERS

INTRODUCTION

Each and every student is unique. Students differ from each other in a number of ways. One way students differ is the way they learn. Dunn and Dunn (1979) stated that not only do students learn in considerably different ways, but certain students succeed only through selected methods. Studies indicate that individuals have the basic capability to learn and teach; however, they are not able to learn and teach effectively in the same exact way (Gregorc, 1979). Therefore, the learning style and teaching style of teachers has implications for student learning (Avery, 1985; Gregorc & Guild, 1984).

Nichols and Mundt (1993) reported a significant difference existed between agricultural educators and home economics educators in the importance placed on individual student differences. Agricultural educators placed individual student differences very low on their list of teaching priorities. Yet, teaching and learning, which are highly influenced by individual differences, should be the heart of the mission in agricultural education. Warmbrod (1992) wrote, "Teaching and learning are the core of the intellectual content of agricultural education as an academic endeavor. . ." (p.26). The focus of the profession must continue to be the deep, rich, complex study of teaching and learning. Has the profession lost sight of the fact that as agricultural educators the most important people in the profession are the students?

"As teachers, we invest a great deal of time thinking about and preparing for what we should teach. Likewise, we should spend an equal amount of time thinking about and preparing for how we should teach" (Cox and Zamudio, 1993). How we teach should be directly correlated to the learning styles of the students in the class. Cano (1991) suggested that "...responsibilities of the instructor are to encourage all learners to learn, provide choices for learners, and above all else, adapt the teaching style to fit the learning style of the learners". If instructors are expected to adjust teaching styles to fit learning styles, some understanding of learning styles is in order.

THEORETICAL FRAMEWORK

Learning styles is not a new concept. However, because educational practitioners started to investigate learning styles at about the time most psychologists were losing interest, progress in the area has been slow (Keefe and Monk, 1986).

Learning style refers to the predominant and preferred manner in which individuals take-in, retain, process, and recall information. "...Learning style is demonstrated in that pattern of behavior and performance by which an individual approaches educational experiences. Learning style represents both inherited characteristics and environmental influences" (Keefe and Monk, 1986, p.1-2).

In considering learning styles, there has been extensive study of the influence the surrounding field has on a person's perception of items within the field as well as its impact on the person's intellectual domains and personality traits. According to Cano, Carton and Raven (1992a), two of the most widely studied learning styles are field-dependence and field-independence. Witkin, Moore, Goodenough and Cox (l977) described the extremes of the aforementioned continuum as follows: when perception is strongly dominated by the prevailing field (a region, space or sphere where mental or physical activity exists), that mode of perception is designated as "Field-Dependent", but when the person experiences items as more or less separate from the surrounding field, the perception is designated as "Field-Independent" (p. 7).

Individuals with a field-dependent learning style tend to perceive the world in a global fashion. Field-dependent learners have a social orientation and best learn material with a social content. Field-dependent learners require externally defined goals and need organization provided for them. Consequently, they may need more explicit instruction in problem-solving strategies. As teachers, field-dependent learners tend to use student-centered activities. They are strong in establishing a warm and personal learning environment. Teachers that are field-dependent are also less likely to provide negative feedback and evaluation towards the student (Witkin, 1973).

Field-independent learners view the world more analytically. Field-independent learners rely on self-defined goals and self-structured situations. Teachers with a field-independent learning style are more subject-centered in their instruction. Field-independent teachers serve more as a "guide" than a "teacher" for their students. Field-independent teachers place more emphasis on the cognitive aspect of instruction. They are more likely to use an inquiry or problem-solving approach to learning due to their analytical perspective (Witkin, 1973). Gaining an awareness of field-dependence and field-independence should add to teachers' and students' ability to use their learning style, appreciate the style differences of others, and to begin thinking about the best classroom methods for facilitating effective learning.

In 1991, Cano, Garton, and Raven concluded that despite the amount of related research regarding learning styles, teaching styles, and personality styles, agricultural teacher educators may be unable to fully use the results since previous studies have not included agricultural teachers. Since the study by Cano et al. (1991) there have been a number of studies that have investigated the learning styles and teaching styles of pre-service agriculture and technology education teachers.

Cano, Garton, and Raven (1992a) found that the learning styles of pre-service agriculture teachers in Ohio do differ. Another study by Cano, Garton, and Raven (1992b) found a moderate relationship between pre-service teachers' learning styles and their ability to demonstrate the problem-solving approach to teaching in a microteaching laboratory. Cano et al. (1992b) found those pre-service teachers that tended to be field-independent tended to do a better job of demonstrating the problem-solving approach to teaching. Similar research by Raven and Shelhamer (1993) found no relationship between learning style and the ability to demonstrate the problem-solving approach to teaching. A study by

Raven, Cano, Garton, and Shelhamer (1993) found that Ohio and Montana pre-service agriculture teachers differ in terms of age, learning style, teaching style, and personality style. Raven and Shelhamer (1993) also found that pre-service agriculture and technology education teachers differ in their learning styles. Pre-service agriculture teachers tended to be field-independent while technology education pre-service teachers tended to be field-dependent.

There have been some similiar findings in these studies. A majority of subjects in the studies majoring in agricultural education have tended to be field-independent. Females majoring in agriculture strongly tend to be field-independent. However, these studies have been limited to two states, Montana and Ohio. Do these findings hold true for other states in different regions of the country? These researchers have commented on the need to expand this line of inquiry to other states and continue to accumulate data concerning the learning styles of agricultural education pre-service teachers (Raven et al., 1993; Raven & Shelhamer, 1993; Cano et al., 1992a).

PURPOSE AND RESEARCH OBJECTIVES

The purpose of this study was to determine, compare, and contrast the learning styles of agricultural education pre-service teachers that attended the 1994 National Collegiate Agricultural Education Conference held in conjunction with the National FFA Convention in Kansas City, Missouri. The following research objectives guided this investigation:

1. To describe the personal characteristics (gender, age, grade point average, FFA background, regional location of university, junior college transfer) of conference participants whose career goal is to teach high school agriculture.

2. To determine the preferred learning style of conference participants whose career goal is to teach high school agriculture as measured by the Group Embedded Figures Test (GEFT).

3. To compare and contrast conference participants' learning styles by selected personal characteristics (gender, regional location of university, junior college transfer).

METHODS

The population for this descriptive study was agricultural education pre-service teachers in the United States whose career goal is to teach high school agriculture. The sample (n = 44) was agricultural education pre-teachers participating in the 1994 National Collegiate Agricultural Education Conference (NCAEC) held in conjunction with the National FFA Convention. The National Agricultural Education Conference was chosen as there are a number of universities and states of the United States represented by pre-service teachers of agriculture each year.

Administration of the GEFT determined the preferred learning style of the subjects as either field-dependent or field-independent. The GEFT is a standardized instrument and considered to be valid and reliable (Witkin, Oltman, Raskin, & Karp, 1971).

A questionnaire was developed by the researchers to determine the demographics of the conference participants. A panel of experts comprised of agricultural education faculty at the home department of one of the researchers established face and content validity of the questionnaire. Pre-service teachers were asked to furnish their age; gender; university attending,; and current grade point average; and to indicate if they took agriculture classes in high school, if they were ever a member of the FFA, if they ever attended a community or junior college, and if their career goal was to teach high school agriculture.

Fourty-four of the 50 conference participants responded that their career goal was to teach high school agriculture and were included in the final sample. Regional location of the pre-service teachers' universities was based on the four agricultural education regions defined by the American Association of Agricultural Educators (Western, Central, Southern, and Eastern). There were no participants from any universities located in the Eastern Region. Consequently, the Eastern Region was omitted from all analyses and resulting tables.

The agricultural education pre-service teachers completed the instrument at the beginning of a seminar on learning styles conducted by the researchers at the NCAEC. Since the pre-service sample was not random it was not appropriate to report inferential statistics and to infer the results to the population. The researchers hand scored all instruments and analyzed the data using Microsoft Excel 4.0©.

FINDINGS

Data summarized in Table 1 reports the gender of the pre-service teachers by AAAE region. The results indicated that 43% (19) of the pre-service teachers were males and 57% (25) were females. Over half of the pre-service agriculture teachers were from universities located in the Central Region. Around one-quarter of the pre-service teachers were from the Western Region (10) and Southern Region(11) respectively. There were nine states represented including; Missouri, Washington, California, Mississippi, Oklahoma, Wisconsin, Florida, North Carolina, and Iowa. The mean age of the pre-service teachers was 22.8 (sd=4.0). Nearly nine out of 10 (39) conference participants were traditional age students (less than 25 years of age). Over three-fourths (35) of the pre-service teachers had taken agriculture classed in high school. Additionally, over three-fourths (35) had been a member of the FFA.

Table 1

Gender of Pre-Service Teachers Attending Conference by American Association of Agricultural Educators Regions (n = 44)

	Female		Male		Total	
Region	n	%	n	%	n	%
Western	7	70.0	3	30.0	10	100.0
Central	12	52.2	11	47.8	23	100.0
Southern	6	54.4	5	45.5	11	100.0
Total	25	56.8	19	43.2	44	100.0

The mean GEFT score of 12.0 for agricultural education pre-service teachers varied from the national norm of 11.4 (Table 2). The mean GEFT score of 13.1 for agricultural education teacher pre-service teachers from the Western Region was the highest. The mean GEFT score of 9.6 for agricultural education pre-service teachers from the Southern Region was the lowest and below the national norm. Female agricultural education pre-service teachers' mean GEFT score of 11.8 was higher than the national norm of 10.8 for females. Females from the Western Region (12.6) and Central Region (12.7) each had mean GEFT scores higher than the national norm; while females from the Southern Region mean GEFT score was less than the national norm. Males from the Western Region (14.3) and Central Region (12.5) also had mean GEFT scores higher than the national norm; while the mean GEFT score for males from the Southern Region was lower than the national norm of 12.5 for males.

Table 2

Group Embedded Figure Test Scores of Pre-Service Teachers Attending Conference by American Association of Agricultural Educators Regions (n = 44)

	Female		Male		Total	
Region	Mean	SD	Mean	SD	Mean	SD
Western	12.6	5.2	14.3	2.5	13.1	4.5
Central	12.7	4.1	12.5	4.0	12.6	3.9
Southern	9.3	4.2	10.0	4.7	9.6	4.2
Total	11.8	4.5	12.1	4.1	12.0	4.3

Data showed that 61% (27) of the pre-service teachers were field-independent learners and 39% (17) were field-dependent learners (Table 3). Over half (15) of the female pre-service agriculture teachers were field-independent. Nearly two-thirds (12) of the male pre-service agricultural education teachers were field-independent.

Table 3

Learning Styles of Pre-Service Teachers Attending Conference by Gender (n = 44)

	Field Dependent		Field Independent		Total	
Gender	n	%	n	%	n	%
Female	10	40.0	15	60.0	25	100.0
Male	7	37.0	12	63.0	19	100.0
Total	17	39.0	27	61.0	44	100.0

Nearly three-fourths (7) of the agricultural education pre-service teachers from the Western Region tended to prefer the field-indpendent learning style (Table 4). Six out of 10 pre-service teachers from the Central Region preferred the field-independent learning style while approximately half of the agricultural education pre-service teachers from the Southern Region tended to be field-indendent.

Table 4

Learning Styles of Pre-Service Teachers Attending Conference by American Association of Agricultural Educators Regions (n = 44)

	Field Dependent		Field Independent		Total	
Region	n	%	n	%	n	%
Western	3	30.0	7	70.0	10	100.0
Central	9	39.1	14	60.9	23	100.0
Southern	5	45.5	6	54.5	11	100.0
Total	17	38.6	27	61.4	14	100.0

Two-thirds of the agricultural education pre-service teachers that had not attended a junior or community college were field-independent learners. One-half (7) of the agricultural education pre-service teachers that had started their post-secondary education at a community or junior college preferred the field-dependent learning style.

Table 5

Learning Styles of Pre-Service Teachers Attending Conference by Junior College Status (n = 44)

JuCo Transfer	Field Dependent		Field Independent		Total	
	n	%	n	%	n	%
No	10	33.3	20	66.7	30	100.0
Yes	7	50.0	7	50.0	14	100.0
Total	17	38.6	27	61.4	44	100.0

CONCLUSIONS

Female agricultural education pre-service teachers comprised a majority of the subjects in this study. In all previous studies concerning learning styles of pre-service agricultural education teachers, the sample always had a majority of males. Previous published studies have only studied pre-service agricultural education teachers in Ohio and Montana, neither which were represented in this study. Of the nine states in this study, several of them such as California, Illinois, and Florida are heavily populated states with hundreds of high school agricultural education programs and more than one university preparing high school agricultural education teachers. States such as California traditionally have a higher percentage of female agricultural education teachers than rural states such as Montana. Gathering data from heavily populated states as well as rural states provides a better view of pre-service teachers in agricultural education and underscores the need for continuing to replicate earlier learning style studies in additional states.

The vast majority of the agricultural education pre-service teachers that attended the NCAEC were traditional age students that had taken high school agriculture courses and had been members of the FFA. Nearly one-half of them came from universities located in the Central Region and while one-fourth came from the Western Region and Southern Region respectively. No pre-service agricultural education teachers from the Eastern Region were present. The number of pre-service teachers from the Central Region is most likely an artifact of the NCAEC being held in the Central Region. Obviously travel to the NCAEC is easier and more affordable for pre-service teachers attending agricultural education programs in universities located in the Central Region than on the west or east coast. Yet the west coast was represented by pre-service teachers from California and Washington and the South was represented from pre-service teachers from Florida and North Carolina (a southeastern coast state). Why weren't there any pre-service teachers from the Eastern Region?

The finding that agricultural education pre-service teachers that attended the NCAEC tend to be field-independent is consistent with other studies that examined the learning styles of pre-service agriculture teachers. However, even though the majority of female pre-service agricultural education teachers preferred the field-independent learning style and their mean GEFT score was higher than the national norm, both the percentage of field-independents and the mean GEFT score was lower than in previous studies. Yet, the mean GEFT scores for female pre-service teachers from the Western Region and Central Region are consistent with earlier studies with GEFT means well above the national norm of 10.8 for females. Female pre-service teachers from the Southern Region, with a mean GEFT score of 9.3, lowered the overall mean for females by nearly one. What accounts for the differences between females in the Southern Region from their female counterparts in the Western Region and Central Region?

Comparisons of learning styles by AAAE region indicate that pre-service agricultural education teachers in the Southern Region tend to be more field-dependent than in the Western Region and the Central Region. This study is the first to report data from pre-service agricultural education teachers attending universities in the Southern Region. Why are these agricultural education pre-service teachers less field-independent than their counterparts in the Western Region and Central Region? One possible explanation is the small sample size and a resulting bias. Perhaps, another possible explanation is the cultural differences among the regions. Once again, however, these differing results demonstrate the need for continued investigation in the area of learning styles. Consistent collection of data in all regions of the United States and collaboration among researchers interested in the learning styles of pre-service agricultural education teachers is needed in order to compile a comprehensive data bank from which definite conclusions can be made.

There were differences in learning style among pre-service agricultural education teachers that attended a junior or community college. Half of the pre-service teachers that started at a junior or community college preferred the field-dependent learning style. In comparison, two-thirds of the pre-service teachers that only attended the university were field-independent learners.

IMPLICATIONS AND/OR RECOMMENDATIONS

The data from this study were used to teach the participants in the study. Thus these pre-service agricultural education teachers left the NCAEC with an awareness of student individual differences regarding learning styles. The pre-service teachers that participated in the learning styles seminar at the NCAEC represented nine states and will likely obtain teaching positions in those states and additional neighboring states. Therefore, these pre-service teachers have an opportunity to incorporate this knowledge into their teaching and hopefully have a positive impact on their students. Research is needed to determine if teachers with knowledge of learning styles are able to incorporate this knowledge into their teaching and to measure resulting impacts.

These data are useful for preparing teachers. For example, teacher educators present at the seminar and readers of this study can explore and use alternative teaching techniques that more closely match their students' learning styles. They will then lead discussions with the pre-service teachers that demonstrate the value of mixing techniques in order to reach various students. Discussions will pinpoint certain techniques that are valued by students of a given style and will make application to secondary education and other settings.

Theis study supports the findings of an Ohio State University study (Cano et al., 1991) which suggested that pre-service student teachers, individually, do differ in learning styles. Additionally, pre-service teachers that attended the NCAEC tended to be different in terms of learning styles based on selected characteristics such as gender, location of university, and previous experience. Why the difference of learning styles among the participants? More important, in light of the differences, what should teacher educators be doing differently? More data needs collected to further study the similar variables in one region and the differing variables between regions to determine support or lack of support for generalizing pre-service teacher characteristics from region to region, and therefore generalizing teaching techniques between regions.

This study as in earlier ones, females tended to be more field-independent than the national norm for the GEFT. However, female pre-service teachers from the Southern Region tend to be more field-dependent than the other regions in this study and previous studies. Why do the females in this study and females in previous learning styles studies of women in agricultural education at these universities tend to be different from the national norms and from literature of female statistics? Which of their characteristics make them field independent? Are these the females who have broken down an initial barrier to entering the profession? Why are females from the South different from other regions? These variables need to be studied longitudinally such that trends and associations can be found.

The mean GEFT scores for pre-teachers in agricultural education at the universities in this study were above the national norm. What are the factors which influence pre-service agricultural education teachers to prefer a more field-independent learning style to students from other majors nationally? More research needs to be conducted to compare other pre-service agricultural education teachers to other pre-service teachers.

What should teacher educators do?

Teacher educators know that the personalities of pre-service students are different, merely meeting the new class makes this claim evident. Is it appropriate to ignore this naturally occurring phenomenon? It is absolutely wrong.

There is a need for teacher educators to discover the learning styles and thus teaching styles associated with their students. By collecting data regarding the learning styles of pre-service teachers in agriculture, and then using the data to teach about these individual differences, the teaching has meaning to the students and the learning comes to life in the classroom.

If a pre-service teacher's learning style is field-dependent, what does that tell teacher educators about the teaching techniques and methods preferred by that student? What does that tell teacher educators about the way in which that student learns best, and therefore about the way that the student will want to teach?

Furthermore, is there a consortium of researchers in agricultural education in the United States who could work cooperatively to examine, in depth, this line of inquiry? Studies such as this are needed to entice and encourage regional and national programmatic research efforts regarding learning styles. There is much to learn about pre-service agricultural education teachers regarding learning styles. Research should be continued in this complex area of teaching and learning.

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THE RELATIONSHIP OF TEACHER KNOWLEDGE AND PERSONAL DEVELOPMENT OF HUMAN RELATION SKILLS IN AGRICULTURAL EDUCATION

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THE RELATIONSHIP OF TEACHER KNOWLEDGE AND PERSONAL DEVELOPMENT OF HUMAN RELATION SKILLS IN AGRICULTURAL EDUCATION

INTRODUCTION AND THEORETICAL FRAMEWORK

Agricultural technology has advanced in America at such a pace producers can scarcely comprehend one set of improvements before additional advances are presented to them. The role of the agricultural education teacher has been not only that of an information giver, but perhaps, more importantly that of a facilitator between past and present. Agriculturalists have been forced to expand their realm of expertise to include areas of marketing, public relations and public education. No longer are agriculturalists isolated on the farm. Today, they are inducted into the main stream of society, and must interact positively there.

Agricultural education teachers are among those responsible for the development and training of future agriculturalists' abilities to deal with the general public. With a continuously shrinking portion of the voting population to support it, agriculture must enhance the abilities of its own population to relate to all of humankind. Therefore, it becomes imperative that the development of human relations skills is encouraged and refined within this sector.

> Still the question recurs "can we do better?" The dogmas of the quiet past, are inadequate to the stormy present. The occasion is piled high with difficulty, and we must rise with the occasion. As our case is new, so we must think anew, and act anew (Phillips, 1992, pg. 137).

In his address to Congress in December of 1862, Lincoln pointed to the need for all to be aware of change and be ready to deal with it. Agricultural education teachers must take the initiative to develop their own human relations skills, in order to be able to pass those skills on to the next generation. Traditionally seen as an area to be introduced to all and cultivated in only a select few, human relations skills now take on added dimension and scope. All agriculturalists must be able to communicate effectively with the general public in years to come.

The need for enhanced human relations skills in all teachers was recognized by the Oklahoma State Legislature through House Bill 2246. Section 4-1 of this bill addressed the teacher preparation system. This section of the bill specified the following outcomes to be included in the teacher preparation system:

f. teachers shall have the ability to interact effectively with diverse students and overcome their own biases;
g. teachers shall have an understanding of different cultures;
h. teachers shall have skills necessary for working with parents as partners in the education process;
i. teachers shall have skill necessary to involve the community in education; and

> j. teachers shall have the skills to foster teamwork within and among schools. (House Bill 2246, 1991).

The human relations skills alluded to in House Bill 2246 were similar to the skills assessed in the questionnaire in this study.

The importance of teaching human relations in general agriculture classes was studied by Field (1986). Field worked with agricultural mechanization programs and graduates of the University of Nebraska. The results of the study indicated that the graduates felt human relations competencies were important to possess, and that no significant differences were found among the competencies.

In 1989, Peper studied the extent of social skills development by vocational agriculture students/FFA members as perceived by selected vocational educators and public school superintendents. Major findings in Peper's study indicated that both the vocational educators and superintendents found the vocational agriculture students/FFA members to be "above average" for all categories within the areas of leadership, etiquette, citizenship, community service, and cooperation. Peper then concluded that social skills development is enhanced for vocational agricultural students/FFA members as more opportunities to develop those skills are available to those students.

As acknowledged in Field's study there was need for human relations skills in general. Peper's study focused on the categories of human relations skills taught and/or developed through agricultural education programs. Therefore, it was felt that there was a logical need through this study to determine the preparedness of agricultural education teachers to develop these skills through their service as role models for their students.

Agricultural educators today are challenged to provide their students direction in basic problem-solving skills, entrepreneurial development, practical application and understanding of scientific concepts and leadership and human relations skills. In the face of an industry changing more rapidly now than ever before, adequate development of these skills is mandatory for the future success and well-being of students.

> Paramount to any discussion of the means by which people of the world may experience more meaningful and productive lives is a more knowledgeable understanding of the role played, and the contributions made, by the industry of agriculture. Such understanding is needed not only by those engaged in work directly to agriculture, but to all people of all nations. (Finley and Price, 1993, pg. 4).

Finley and Price acknowledged the need for agriculturalists both to understand their industry and to be able to communicate its value and uniqueness to others. As the world becomes smaller and Americans are forced to compete in a global market, the importance of human relations skills increases.

PURPOSE AND OBJECTIVES

The purpose of this study was to assess agricultural education teachers' perceptions of their personal development and understanding of human relations skills in agricultural education. This study also attempted to discover if, in the five states identified, agricultural education teachers perceived they were equipped with enough human relations skills to function adequately in the communities they served.

The objectives of the study were as follows:

1. To determine the perceptions of a randomly selected representative sample of agricultural education teachers, from a five state area (Arkansas, Louisiana, New Mexico, Oklahoma and Texas), regarding the importance of specific human relations skills.
2. To determine the perceptions of agricultural education teachers concerning...
   a. the most valuable human relations skill for agricultural education teachers;
   b. the level of importance of motivational and leadership skills needed by agricultural education teachers;
   c. the importance of conflict resolution skills needed by agricultural education teachers.

PROCEDURE

A stratified proportional sample of certified agricultural education teachers was randomly selected from the five states. The five states were chosen in order to provide a more inclusive sample of the central-southern region of the country.

Using the *Table for Determining Needed Size of a Randomly Chosen Sample From a Given Finite Population of Cases Such that the Sample Proportion will be Within ± .05 of the Population Proportion with a 95 Percent Level of confidence* (Krejcie, R. V. and Morgan, D. W., 1970. p. 607-610), the researcher used 2400 as a population base. Referring again to Krejcie and Morgan's table it was determined that 331 agricultural education teachers would comprise the sample needed. This translated into 37 teachers from Arkansas, 33 teachers from Louisiana, 10 teachers from New Mexico, 48 teachers from Oklahoma and 203 teachers from Texas. Of the 331 questionnaires mailed 174 were returned completed, accounting for 52.56 percent of the original mailing.

Once the initial set of questions was developed the instrument was reviewed critically by a panel of experts. Faculty members from the Agricultural Education Department and the Animal Science Department in the College of Agriculture and Natural Resources at OSU critiqued the instrument and offered suggested revisions. Appropriate revisions were made and the instrument was completed for mailing.

A packet was mailed November 1, 1993 to each member of the study sample. On Wednesday, December 1, 1993, a follow-up letter, encouraging those who had not yet returned the initial instrument to respond, was mailed to each of the non-respondents.

Descriptive statistics were utilized to analyze the data collected from the questionnaire. All data were processed through the SAS System in order to obtain descriptive statistics including means, standard deviations, frequency distributions and mean of means. Realizing frequency distribution includes numbers and percents, mean scores were also used to interpret the data. Information concerning the perceptions of human relations skills development by agricultural education teachers in relation to both their personal and institutional growth was gleaned from the instrument.

Respondents rated their perceptions of human relations skills development in relation to specific questions in the questionnaire using four point and five point "Likert-type" scales. One yes or no question was included concerning attitudes toward the incorporation of human relations skills into an agricultural education teaching methods course. Four open-ended questions were also included.

RESULTS AND FINDINGS

In reviewing the findings of this study, the average (mean) number of years of experience of the respondents was 15.15 with a standard deviation of 8.53. Of the respondents 58.05 percent (101) were teaching in Texas; 15.52 percent (27) were teaching in Oklahoma; 12.07 percent (21) were teaching in Louisiana; 9.77 percent (17) were teaching in Arkansas; and 4.60 percent (8) were teaching in New Mexico.

When the mean responses of the 174 agricultural education teachers were combined, the mean of means revealed that the ability to utilize various human relations skills was perceived to be "very important" for all categories within the area of Human Relations and Personal Attributes. (Table 1). The combined mean responses of the respondents also suggested that they perceived the importance of categories in the area of Motivation to be "very important" (Table 2). Categories within that area include: ability to motivate yourself; ability to motivate students; ability to use motivational techniques; understanding the effect of a negative attitude on a person's motivation; and understanding the influence of stress on motivation. Also revealed in Table 2, under the area of Leadership and Cooperation, agricultural education teachers perceived their extent of development in all categories to be "above average". Categories in this area reflected the extent of development of : their leadership skills; a sense of pride; self-initiative; the ability to set priorities; the ability to manage their time; the ability to act as spokesperson; and the ability to live up to the expectation of others.

As reported in Table 3, development was perceived to be "above average" for all categories within the area of specific human relations skills. Categories included: the ability to work with others; patience; good attendance practices; and the ability to delegate work responsibilities. Also, as revealed in Table 3, teachers perceived the extent they developed skills regarding Professional Etiquette and Conflict Resolution to be "above average". Categories included there: tactfulness; sportsmanship; self-discipline; a respect for the rights of others; a sense of integrity; responsibility; dependability; punctuality. Finally, Table 3 revealed the perception that it was "important" for agricultural education teachers to practice specific human relations skills. Skills included in that category were: accept constructive criticism; objectively discuss differences of opinion; remain emotionally stable during a conflict; defuse a potentially explosive conflict situation; maintain a non-combative attitude when faced with conflict, and to compromise in the face of conflict.

Table 1

Perceptions of Development of Human Relation Abilities and Personal Attributes, Importance of Personal Feelings, Public Relations and Acceptance by Co-Workers, and Certain Social Movements

Human Relations Skills Areas		Mean Responses	(N = 174) Standard Deviation	Denotes
Human Relations and Personal Attributes				
How important is it for you as an agricultural education teacher to be able to...				
1.	assume responsibility	3.92	0.26	very important
2.	display positive attitude?	3.82	0.38	very important
3.	make decisions on the job?	3.86	0.34	very important
4.	cope with stress?	3.78	0.44	very important
5.	learn through mistakes?	3.67	0.51	very important
6.	accept constructive criticism?	3.56	0.57	very important
7.	establish effective relationship with fellow teachers and staff?	3.55	0.57	very important
8.	establish effective relationship with supervisor?	3.64	0.51	very important
Personal Feelings, Public Relations and Acceptance by Co-Workers				
How important is it for you as an agricultural education teacher to know...				
9.	that the stronger a person feels about an issue the more likely they will do something about it?	3.30	0.65	very important
10.	the importance of good relations with the public?	3.73	0.45	very important
11.	the need to be accepted by co-workers?	3.16	0.64	important

*Not all respondents chose to respond to all questions.

Table 2

Perceptions of the Importance of Teacher Abilities Regarding Motivation, and Leadership and Cooperation Skills

Human Relations Skills Areas		(N = 174) Mean Responses	Standard Deviation	Denotes
Motivation				
How important is it for you as an agricultural education teacher to be able to...				
1.	motivate yourself?	3.81	0.39	very important
2.	motivate students?	3.84	0.35	very important
3.	use motivational techniques?	3.66	0.48	very important
How important is it for you as an agricultural education teacher to understand...				
4.	the effect of a positive attitude on a person's motivation?	3.67	0.48	very important
5.	the effect of a negative attitude on a person's motivation?	3.58	0.54	very important
6.	the influence of stress on motivation?	3.51	0.55	very important
Leadership and Cooperation				
To what extent do agricultural education graduates develop...				
1.	their leadership skills?	4.26	0.68	above average
2.	a sense of pride?	4.15	0.65	above average
3.	self-initiative?	4.08	0.73	above average
4.	the ability to set priorities?	3.94	0.72	above average
5.	the ability to manage their time?	3.79	0.80	above average
6.	the ability to act as spokesperson?	4.08	0.74	above average
7.	the ability to live up to the expectations of others?	3.88	0.68	above average

*Not all respondents chose to respond to all questions.

Table 3

Perceptions Regarding Development and the Importance of Human Relations Skills

Human Relations Skills Areas		(N = 174)	
	Mean Responses	Standard Deviation	Denotes
Development of Human Relations Skills			
To what extent did you develop the following skills during your undergraduate studies in agricultural education...			
1. the ability to work with others?	3.83	0.75	above average
2. patience?	3.60	0.75	above average
3. good attendance practices?	4.23	0.86	above average
4. the ability to delegate work responsibilities?	3.54	0.79	above average
Professional Etiquette			
To what extent did you develop the following skills during your undergraduate studies in agricultural education			
1. tactfulness?	3.54	0.68	above average
2. sportsmanship?	3.75	0.73	above average
3. self-discipline?	3.88	0.74	above average
4. a respect for the rights of others?	3.97	0.72	above average
5. a sense of integrity?	4.01	0.71	above average
6. responsibility?	4.13	0.76	above average
7. dependability?	4.20	0.76	above average
8. punctuality?	4.12	0.79	above average
Conflict Resolution			
As an agricultural education teacher, how important is it for you to be able to...			
1. accept construction criticism?	3.40	0.54	important
2. objectively discuss differences of opinion?	3.45	0.54	important
3. remain emotionally stable during a conflict?	3.59	0.55	very important
4. defuse a potentially explosive conflict situation?	3.60	0.52	very important
5. maintain a non-combative attitude when faced with conflict?	3.53	0.55	very important
6. to compromise in the face of conflict?	3.30	0.61	important

*Not all respondents chose to respond to all questions.

CONCLUSIONS AND RECOMMENDATIONS

Based on the findings of this study, the researcher concluded the following:

1. Human relations skills were perceived to be very important to the success of agricultural education teachers in the five states studied.
2. A generalized concept of skills most needed by agricultural education teachers indicates the most valuable skill is the ability to get along with and work with others.
3. All phases of motivational skills are considered very important by agricultural education teachers and necessary for an effective program. Attitude toward motivation and motivational techniques determines the usefulness of these skills.
4. The need for teachers to project a dependable, cooperative image enhances their relationships with other professionals.
5. The ability to accept constructive criticism combined with a stable and calm attitude during conflict situations can lead to the diffusion of potentially explosive situations. Respondents felt the need for these skills was very important.
6. Teachers perceived themselves to be adequately prepared in human relations skills to serve their communities, however, continual need for improvement of these skills was recognized.
7. In acknowledging the need for human relations skills, teachers' responses also reflected that changing times and social movements require additional skill levels.

Traditional agriculture has undergone and continues to undergo a revolution. Rapid advances in biotechnology and information technology continue to alter the structure of the American agricultural sector. Technology has created situations that must be acknowledged and dealt with. Surplus commodities, trends toward large industrialized farms and the need to maintain complex and costly new technology in order to remain competitive are but a few of the problems facing today's agriculturalists (Congress of the United States, 1985).

In light of the fact that agriculturalists are an ever shrinking group of voters, effective communications and relations must be developed among their legislative representatives and the general voting populace. Human relations skills must be honed and future leaders and producers trained to keep the channels of communication open and viable.

Based on the findings and conclusions of this study, the researcher presents the following recommendations:

1. In an effort to prepare current teachers to deal with a changing society, continued human relations skills development courses should be offered regularly. In addition to traditional issues, current social movements should be included in these development sessions.
2. Agricultural education teachers should continue to develop their human relations skills by attending courses in development and by continued practice of existing skills.

In regard to additional research the following recommendations have been made. The recommendations are judgments based on having conducted the study and on the review of the findings of the study.

1. More specific studies concerning the types of development courses needed for continued improvement of human relation skills should be conducted.

2. Similar research to this should be conducted concerning the perceptions of students, school administrators and other teachers concerning the level of development and use of human relations skills by agricultural education teachers.

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THE ROLES OF TENNESSEE EXTENSION 4-H SPECIALISTS AS PERCEIVED BY AGENTS, SPECIALISTS, AND ADMINISTRATORS: A DELPHI STUDY

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INTRODUCTION AND THEORETICAL FRAMEWORK

The Cooperative Extension System was established in 1914 with the passage of the Smith-Lever Act. The audience of the Cooperative Extension System is served through four traditional program areas: Agriculture, Home Economics, 4-H and Youth, and Community Development. The Tennessee division of the Cooperative Extension System is called the Tennessee Agricultural Extension Service.

4-H is the primary youth education program of the Cooperative Extension System. It involves youth and volunteer leaders in programs which help the youth in "acquiring knowledge, developing life skills, and forming attitudes that will enable them to become self-directing, productive members of society" (USDA Cooperative Extension System, 1994). The Tennessee 4-H program has a long tradition of excellence with over 170,000 members and nearly 17,000 volunteer leaders. Businesses and individuals also support the Tennessee 4-H program by contributing more than $1 million annually for awards and educational trips (Tennessee Agricultural Extension Service, 1993).

The Tennessee Agricultural Extension Service employs specialists who give leadership to the Tennessee 4-H Program. A review of the literature indicates that Extension 4-H specialists provide state-wide direction and supervision of the 4-H Youth program, and are accountable for its operation (Goering, 1978; Taylor, 1989; Tumusiime, 1983). Implementation of the 4-H program is carried out by county 4-H Extension agents and volunteer leaders under the management of district supervisors (Goering, 1978).

State Extension specialists have traditionally bridged the gap between land-grant college faculty and "persons not attending or resident in said colleges in the several communities, and imparting information on said subjects through demonstrations, publications, and otherwise..." (Smith-Lever Act, Section 2). However, the Cooperative Extension System has necessarily adapted and changed since its inception years ago in order to satisfy both old and new clientele and their ever-changing needs (Gerber, 1985; Patterson, 1991; and Wallace, 1985).

While many feel that looking to the future, planning ahead, and change is definitely good for the Cooperative Extension System, some claim that it can give rise to problems. Carroll (1989) found that the process of change can result in ambiguous roles and responsibilities, and cause disagreement as to the specific jobs of staff members. He mentioned that this creates the "need for planned and deliberate Extension staff involvement in their jobs and the continuous re-definition of their roles as well as those of their colleagues" (Carroll, 1989, pp. 12). Wallace (1982) stated that "specialists will have to change their roles in order to survive and be in the forefront of off-campus education" (pp. 882).

While certainly the process of change has increased the ambiguity surrounding the roles of Extension specialists, in actuality the roles of Extension specialists have been debated for many years. A 1958 study by Brown and Deekens cited studies from Iowa, Florida, and Louisiana which all identified specialist functions. In 1984, Feller concluded that the current and future roles of Extension specialists are definitely very ill-defined, and traditional relationships between agents and specialists are blurred. Specialists often assume clarity and understanding of their roles which sometimes leads to misunderstanding between Extension staff members (Wallace, 1982).

Fancher (cited in Shaver, 1985) completed a study involving Missouri continuing education specialists, their supervisors, and faculty. He found significant differences in these three groups' perceptions of the actual and ideal roles of the specialists. Specialists hear competing or contradictory expectations from academic department administrators, and county Extension agents, leading them to be understandably confused about their roles and responsibilities (Burcalow et al, 1981; Wessel, 1985; Etling & Tuttle, cited in Carroll, 1989).

The position of the state Extension specialist is rather complicated and multi-faceted (Wessel, 1985). The responsibilities of the position range widely from state to state and with different types of appointments (Feller, 1984 and Wessel, 1985). Specialists serve as resource persons for agents and sometimes have the responsibility for developing projects for youth participation (Shih & Evans, 1991 and Waguespack & Moss, 1989). Coleman and Barranti (1990) found that most family life specialists consider their primary responsibility to be the development of "research-based educational programs" which are implemented by county agents (pp. 30).

The roles of specialists change between program areas (Wessel, 1985). Therefore, the roles and responsibilities of 4-H specialists may be very different than those of subject matter specialists. 4-H specialists have statewide responsibilities for 4-H-related programs which encompass many different subjects, and so 4-H specialists must determine what their particular responsibilities are within each area. Very little research has been completed recently to help Extension 4-H specialists in defining their specific roles and responsibilities, although Wessel (1985) did find that 4-H youth development state specialists consider teaching aspects of their position to be more important than research aspects.

PURPOSES AND OBJECTIVES

The purpose of the study was to identify a prioritized list of roles that Tennessee Extension 4-H specialists should perform. Furthermore, the study sought to describe any perceived differences in the means and standard deviations between the three subgroups of panel members. The consensus from the Delphi panel could be used to clarify the responsibilities of the specialists, and provide information on which to base decisions about their responsibilities and programs.

METHODS AND PROCEDURES

A modified Delphi technique was used on a purposefully selected panel of experts to generate data. The panel, which represents approximately 10% of the total population, included three groups of Tennessee Agricultural Extension Service employees: (1) county 4-H agents, (2) specialists, and (3) administrators. The representatives of each group were chosen through a selection process using specific criteria. After selection of all of the respondents, the panel was comprised of 38 individuals. Following panel selection, a phone call was made to each person to establish contact and confirm their willingness to participate in the study.

The modified Delphi Technique used in this study began with a questionnaire that had an open-ended format, asking respondents to generate a list of 10 roles that Tennessee Extension 4-H specialists should perform. An appropriate cover letter was developed and attached to the first-round questionnaire. Two weeks after the mailing, a follow-up phone call was made to all non-respondents. Upon receiving the first round of questionnaires, the researcher read and summarized the responses, and deleted all duplications. A 97% return rate was obtained with the first round of questionnaires.

The second questionnaire consisted of the list of roles with a rating scale beside them. The respondents were asked to rate the roles between 1 (most important) and 9 (least important), and return the questionnaire. Follow-up was conducted in the same manner as was used in round one. After receiving the second round of questionnaires, the researcher calculated the arithmetic mean and standard deviation for each of the roles. A 92% return rate was obtained with the second round of questionnaires.

The third questionnaire was developed by ranking the roles from most important to least important by arithmetic mean. Panel members were provided the group means and their own individual ratings of each item. They were then asked to make any changes in the rating of the roles that they felt necessary, and to give explanation for those changes. Comments and suggestions from the third round questionnaire were used to develop "minority opinion" statements for the final report to help explain lack of consensus regarding some roles. Follow-up phone calls to non-respondents were once again made two weeks after the mailing. A 92% return rate was obtained with the third round of questionnaires. Total response rate for all three rounds was 94%.

Importance and consensus are key elements in reporting on a Delphi study, with importance being shown by arithmetic means, and consensus shown by standard deviations. Therefore, arithmetic means and standard deviations were calculated to analyze each of the roles identified. Strong importance is represented by a low arithmetic mean, and strong consensus is represented by a low standard deviation.

RESULTS

The panel of experts produced 316 individual responses to the round-one questionnaire. However, many of these responses were nearly identical in content or idea, so several responses were deleted to avoid duplication in the final list. The second round questionnaire consisted of 157 roles. This round-two document was then mailed back to the panel members, and they rated each item on a scale with one being most important and nine being least important. Mean scores were tabulated to determine overall importance and standard deviations were calculated to determine consensus.

In order to make comparisons of roles, it is necessary to divide them into categories according to importance. The researcher used average mean scores to categorize the list of roles into groups considered to be "Important," "Moderately Important," and "Unimportant." The limits for these groups are as follows: 1 - 2.49 = Important, 2.50 - 4.49 = Moderately Important, and ≥4.50 = Unimportant. Standard deviations of 2.00 or less indicate that consensus was reached. Standard deviations of greater than 2.00 represent a lack of consensus. The round-three questionnaire asked panel members to compare their rating to the average group rating and provide comments.

Table 1 contains the 34 roles which are categorized as important because they all have average mean scores of 1 - 2.49. Also, the overall standard deviation scores of 2.00 or less show that consensus was reached for each of these roles. The table also includes the mean and standard deviation scores for each of the three groups of panel members.

This table of roles contains a wide variety of subjects. Many of these relate somewhat to the process of change since they involve keeping up-to-date and informed about new trends and methodology, communicating these to agents and leaders, and using this information to direct the future of programs and make decisions. The numerical results and written comments made it evident that panel members want to see change when it is needed, instead of doing things the way they have always been done. Administrators, especially, indicated that these types of roles were important.

Several of the roles related to change also mentioned programs. Panel members indicated that it is important for 4-H specialists to constantly work with county, district, and state staffs to review current program direction, set realistic goals and objectives for the future, and make changes in programming as necessary. An essential part of each step of this process is communication with those faculty members who have some level of 4-H responsibilities, especially county agents. Included in these program-related roles is one role which ranked 16th overall and stated "Develop more programs and activities in which competition and winning is not the goal or end result." Administrators rated this item with more importance than did specialists or agents.

Table 1. Roles of Tennessee Extension 4-H Specialists Categorized as Important - Prioritized by Mean Scores

Role	Agents		Specialists		Administrators		Total	
	M*	S.D.	M*	S.D.	M*	S.D.	M*	S.D.
1. Keep programs relevant and up-to-date.	1.20	.42	1.60	.82	1.00	.00	1.41	.70
2. Be dedicated to improving the lives of young people.	1.64	.81	1.45	.69	1.25	.50	1.49	.70
3. Always be ready to change,instead of getting caught up in the way it has always been done.	1.73	.79	2.00	1.08	2.00	.82	1.91	.95
4. Supply answers and respond to requests from agents and 4-H'ers within a reasonable time period.	1.64	1.12	2.00	.79	1.75	1.26	1.97	.98
5. Relay new trends and methodology to agents in a timely manner through inservice and other means.	2.18	1.54	2.00	1.08	1.25	.50	1.97	1.20
6. Be open-minded.	1.91	1.38	2.15	1.14	1.50	.58	2.00	1.16
7. Keep abreast of new trends and methodology in youth development.	2.27	1.42	2.00	1.03	1.75	.96	2.06	1.14
8. Serve as positive role models for field staff and clientele in order to help motivate and inspire them.	2.09	1.51	2.20	1.36	1.50	.58	2.09	1.34
9. Review program directions, determine futuristic directions and objectives, and make changes in programs to meet the needs of clientele.	2.27	1.19	2.15	1.23	1.50	.58	2.11	1.16
10. Read, train, and study to keep up with all new methods, technology and trends; and stay current on youth issues.	2.45	1.63	2.10	.97	1.50	.58	2.14	1.19
11. Make information interesting and readable.	1.64	.92	2.35	1.63	2.50	1.73	2.14	1.46

Table 1. Roles of Tennessee Extension 4-H Specialists Categorized as Important - Prioritized by Mean Scores (Continued)

Role	Agents		Specialists		Administrators		Total	
	M*	S.D.	M*	S.D.	M*	S.D.	M*	S.D.
12. Work with subject matter specialists and other faculty to help them develop educational programs in their area that are suitable for youth and pertinent to this age level.	1.91	.94	2.50	1.43	1.25	.50	2.17	1.27
13. Should constantly work to improve teaching, educational programs, the excellence of county faculty, and the quality of volunteer leaders.	2.27	1.35	2.30	1.42	1.25	.50	2.17	1.34
14. Should not promise what they can't deliver.	1.91	1.14	2.30	1.92	2.25	1.26	2.17	1.62
15. Be creative.	1.82	1.25	2.50	1.64	1.75	.96	2.20	1.47
16. Develop more programs and activities in which competition and winning is not the goal or end result.	2.27	2.00	2.25	2.10	1.75	.96	2.20	1.94
17. Assist administration in making decisions by providing facts and recommendations.	2.45	1.69	2.35	1.39	1.00	.00	2.23	1.46
18. Develop and conduct useful inservice training for county 4-H agents and volunteers that addresses the delivery of youth programming to 4-H'ers.	2.09	1.38	2.37	1.57	2.00	.82	2.24	1.42
19. Work with county, district, and state staffs in program planning to develop an integrated 4-H program.	2.36	1.21	2.35	1.23	1.50	.58	2.26	1.17
20. Realize that their area is not the only area to which faculty are assigned.	2.09	1.45	2.40	1.23	2.25	1.26	2.29	1.27
21. Be great communicators with all people, including clientele, agents, and news media.	2.55	1.57	2.15	1.31	2.25	.96	2.29	1.34
22. See that curriculum is developed in a timely manner on today's "hot" topics for use by 4-H agents and volunteers.	1.64	.81	2.70	1.66	2.25	1.89	2.31	1.51

Table 1. Roles of Tennessee Extension 4-H Specialists Categorized as Important - Prioritized by Mean Scores (Continued)

Role	Agents		Specialists		Administrators		Total	
	M*	S.D.	M*	S.D.	M*	S.D.	M*	S.D.
23. Help keep agents up-to-date about 4-H program or project happenings.	1.82	1.47	2.45	1.43	3.00	2.16	2.31	1.53
24. Inform county faculty about all changes and/or new opportunities within the state's 4-H program.	2.27	1.74	2.35	1.35	2.25	2.50	2.31	1.57
25. Coordinate the development and revision of attention-getting, timely educational teaching materials and programs which can be used in club meetings.	1.64	.81	2.75	1.21	2.50	1.73	2.37	1.24
26. Provide leadership in developing top-priority statewide 4-H program initiatives.	2.55	1.21	2.30	1.38	2.25	1.89	2.37	1.35
27. See that projects are available which suit 4-H members needs.	1.64	.67	2.85	1.53	2.00	1.41	2.37	1.40
28. Actively gain assistance from donors to support and expand 4-H program needs.	2.27	1.74	2.70	1.75	1.00	.00	2.37	1.70
29. Provide early notification for 4-H activities and deadlines to all involved	2.18	1.47	2.50	2.04	2.25	1.50	2.37	1.78
30. Be realistic in their goals and objectives.	2.27	1.49	2.30	2.13	3.00	1.41	2.37	1.85
31. Supply information in layman's language to county staff to assist them.	2.09	1.64	2.55	1.15	2.67	1.53	2.41	1.33
32. Give positive feedback when their information is used well.	2.36	1.50	2.45	1.23	2.50	1.29	2.43	1.29
33. Serve as an authority in their field.	2.18	1.40	2.30	1.59	3.75	2.99	2.43	1.74
34. Develop literature that presents a challenge to youth enrolled in the project.	2.00	1.10	2.35	1.46	4.50	3.11	2.49	1.72

* Mean scores of: 1 - 2.49 = Important; 2.50 - 4.49 = Moderately Important; ≥ 4.50 = Unimportant

Some of the items in Table 1 really dealt more with qualities and attitudes that panel members thought were appropriate for Extension 4-H specialists, than with the performance of actual roles. However, the mean and standard deviation scores indicate that panel members strongly agreed that the personal and professional development of 4-H specialists and their attitudes toward their work are considered to be more important than some of the roles that they actually perform. For example, the 2nd most important role states "Be dedicated to improving the lives of young people." Other items included suggestions that Extension 4-H specialists be open-minded and creative, and not promise what they cannot deliver. Also, panel members suggested that 4-H specialists should read and study about youth issues and the current trends in youth development.

Several of the roles in Table 1 involved materials and/or curricula. Role number 34 represented the biggest difference in the scores of the three groups of panel members. It stated "Develop literature that presents a challenge to youth enrolled in the project." Specialists, and to a greater degree, agents, considered this to be important. Administrators did not reach consensus on this item and their average mean score is categorized as unimportant. In addition, the 11th role stated "Make information interesting and readable." Again, agents strongly considered this to be important whole specialists reached consensus that it was moderately important. Other roles mentioned the development and/or procurement of, and distribution of different types of materials and curricula. This might include teaching materials to be used in club meetings or curricula about currently popular topics which could be used by agents or volunteers. This also includes working with other specialists and faculty to develop educational programs in their areas of expertise which meet the needs of 4-H members.

Other roles included in Table 1 relate simply to support of faculty who have 4-H responsibilities. All three groups of panel members indicated that it is important for 4-H specialists to quickly answer questions and respond to requests from agents and 4-H'ers. Administrators completely agreed that they would like to receive facts and recommendations from 4-H specialists to use in making decisions. Other roles indicate that it is important, especially to agents, that 4-H specialists clearly and consistently communicate information, including early notices for deadlines, and changes and/or new opportunities in the 4-H program. The 28th role states "Actively gain assistant from donors to support and expand 4-H program needs." Both agents and administrators rated this as an important role, while specialists only rated it as moderately important.

CONCLUSIONS

This descriptive study was designed to produce a prioritized list of roles that Tennessee Extension 4-H specialists should perform. The data obtained in this study provides information that could be used to describe the ideal group of Tennessee Extension 4-H specialists. This group would actually be a unified, cooperative team focused on a single set of goals and objectives. Each of these 4-H specialists would certainly exhibit individual strengths, but they should also demonstrate other characteristics including: an open mind, creativity, dedication, and enthusiasm. They should read, train, and study to keep themselves and their programs current, and communicate any new information gained to other Extension faculty.

This group should place top priority upon program planning roles such as evaluation, needs assessment, and the selection and coordination of programs and activities for the future. Other high-priority roles would include procuring teaching materials and curricula, expansion of donor support, and serving as a resource for leaders and Extension faculty at all levels.

This team of Tennessee Extension 4-H specialists should serve as excellent leaders for the state 4-H program. This requires good communication and cooperation between faculty. Also, this team should be responsible for keeping all aspects of the state program; teaching, materials, programs, and leaders of the highest possible quality. This ensures that the Tennessee 4-H program will remain strong and successful in the future.

RECOMMENDATIONS REGARDING SPECIFIC ROLES FOR TENNESSEE EXTENSION 4-H SPECIALISTS

1. In order to keep programs relevant and up-to-date, Tennessee Extension 4-H specialists should coordinate the constant process of program planning, including the conducting of needs assessments, evaluation of programs and materials, and determination of futuristic objectives and priorities.

2. Tennessee Extension 4-H specialists should be open-minded, creative, and dedicated to improving the lives of young people.

3. Tennessee Extension 4-H specialists should participate in advanced training and professional improvement activities to keep up with new trends and methodology in youth development, and should be willing to update and change as need indicates.

4. Tennessee Extension 4-H specialists should coordinate the procurement of interesting and timely educational teaching materials and curricula.

5. Tennessee Extension 4-H specialists should serve as a resource in 4-H and youth development by providing facts, making recommendations, and supplying answers and responding to requests within a reasonable time period.

6. Tennessee Extension 4-H specialists should develop and conduct useful inservice training for county 4-H agents and volunteers that addresses the delivery of youth programming to 4-H'ers.

7. Tennessee Extension 4-H specialists should provide timely notification to agents regarding new trends and opportunities in 4-H and youth development, changes in programs, and event information.

8. Tennessee Extension 4-H specialists should identify and gain assistance from donors to support and expand educational 4-H programs.

9. Tennessee Extension 4-H specialists should perform as a unified team working toward a common educational vision and mission, with all specialists using their individual strengths to complete their assigned duties.

10. Tennessee Extension 4-H Specialists should constantly work to improve teaching, educational programs, the excellence of county faculty, and the quality of volunteer leaders.

11. Tennessee Extension 4-H specialists should assist in the development of competent volunteer leaders by producing curriculum, training materials, and programs for use with volunteer leaders.

12. Tennessee Extension 4-H specialists should coordinate public relations, publicity, and marketing of statewide 4-H programs and their educational impacts in order to create awareness and interest among the public.

ADDITIONAL RECOMMENDATIONS

Based upon the knowledge gained from this study, it is recommended that Tennessee Extension 4-H specialists:

1. Carefully evaluate the results of this study to gain a good understanding of the top-priority roles established.

2. Evaluate their current roles in relation to the data found in this study to determine similarities and dissimilarities.

3. Work cooperatively to select and perform roles which reflect the needs and desires of Tennessee Extension faculty and clientele.

4. Constantly seek information regarding the roles of Extension 4-H specialists in order to keep the Tennessee 4-H program current and successful.

Also, based upon the knowledge gained from this study, it is recommended that:

1. Additional study be completed to further define top-priority roles for Tennessee Extension 4-H specialists.
2. This type of research be repeated periodically to ensure that the roles of Tennessee Extension 4-H specialists fulfill the needs and desires of Tennessee Extension faculty and clientele.

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A COMPARATIVE STUDY OF THE PUBLIC'S KNOWLEDGE AND ASSESSMENT OF THE PURPOSE AND PROGRAMS OF THE TEXAS AGRICULTURAL EXTENSION SERVICE IN METROPOLITAN VERSUS NONMETROPOLITAN COUNTIES

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A COMPARATIVE STUDY OF THE PUBLIC'S KNOWLEDGE AND ASSESSMENT OF THE PURPOSE AND PROGRAMS OF THE TEXAS AGRICULTURAL EXTENSION SERVICE IN METROPOLITAN VERSUS NONMETROPOLITAN COUNTIES

INTRODUCTION AND THEORETICAL FRAMEWORK

The Texas Agricultural Extension Service (TAEX) was created in 1915 by a joint resolution of both houses of the Texas Legislature that accepted the terms of the Smith-Lever Act (Haney, 1989). The organization has a proven history of success for improving the life of rural Texans. Historically, programming has been directed primarily at the rural population, and the service has experienced favorable support and funding (Meier, 1989). However, as we move into the mid '90s, it is a reality that not only Cooperative Extension Service programs, but all governmental agencies, have come under close scrutiny from both the general public and legislators. For such organizations to be responsive to needed changes, continuous assessment of the efficiency and effectiveness of their programming is crucial. Survival of any agency in today's environment of close examination demands a competent, potent, and responsive organization that can and will adjust in order to achieve its intended mission.

A major criticism of Extension today is that its "target" population, rural farmers, represents a far smaller portion of the population than it did in 1914. Warner and Christenson (1984) asked a pointed question: "Can an organization conceived in 1914 as a way to get farmers to adopt improved agricultural practices continue to be relevant when it celebrates its 100th birthday?" (p. 125). "Change is the one constant in today's world, and patterns of change are varied and mixed" (Extension Committee on Organization and Policy (ECOP), 1991, p. 1). TAEX has attempted to adjust programming to meet the new challenges presented by the rapid and constant change Texas is experiencing. Just as in many states, Texas has seen a large movement of the population from rural to metropolitan areas, resulting in an ever decreasing nonmetropolitan population. One of the greatest challenges facing TAEX is quality planning that will result in programs that will meet the needs of its changing clientele. To design effective strategies to implement appropriate educational programming, it is imperative that TAEX discern the characteristics of its audience.

Nolan and Lasley (1979) discuss two questions relevant to Extension. "First, what's the current situation regarding the use of Extension services by the different segments of the agricultural community? Second, what client groups should Extension be working with if the current trends continue?" (p. 21). How aware is the general public of TAEX purpose and programs? For any agency to be successful, potential clientele must be aware of the organization, its purpose, and potential value to the client (Katz, Gutek, Kahn, and Barton, 1975). It might be assumed that traditional rural audiences would have a high degree of knowledge relating to TAEX activities and services, but the same assumptions cannot be made for non-traditional audiences. How many urban residents know TAEX exists? If they know of its existence, how much do they know about its programs and services? The need for dissemination of information about government services is considerably more acute in some service areas than others (Katz et al., 1975).

Warner and Christenson (1984) found in their national study that less than half of those surveyed had ever heard of the Cooperative Extension Service. They also state that awareness is an indicator of the image an organization projects to the public. "If a particular segment of the population is less aware of the organization and its programs, it is unlikely that they will become clientele or support the organization in the allocation of resources. An important reason for examining the image of Extension held by the general public is to be able to compare their perception with that of organizational leaders and policymakers" (p. 54).

Several problems exist with long-range evaluation and perception studies. Warner and Christenson (1984) cite narrow focus, such as examining one specific program area, and agency bias as two major problems. Many of the studies have been conducted by Extension, USDA, or related agencies, and samples have often been composed primarily of Extension clientele. Agency evaluations are frequently criticized or ignored because they are seen as biased expressions of selected clientele by agency personnel (Warner and Christenson, 1984). Katz et al. (1975) indicate that many of the evaluation studies suffer from poor planning and inadequate implementation. "For the greater part they consist of monitoring techniques, cost-benefit analyses, case studies, secondary analyses of data gathered for other purposes, *ex post facto* measurements of the effectiveness of a single program, and non-systematic assessments by so-called experts. Generally the reactions of the recipients of a service program are neglected in evaluating the functioning of public agencies" (p. 8). "In spite of the popularity of the term *evaluation research*, there has been a conspicuous neglect of systematic assessment of the operations of public agencies and programs" (p. 180).

"Government agencies in particular have long been criticized for setting up informational feedback systems so limited that they safeguard agencies from criticism and isolate them from adequate and valid information on matters of major relevance" (Katz et al., 1975, p. 1). Katz et al. further state:

> The perceptions, attitudes, and experiential reports of people about specific government offices and procedures constitutes only one source of information about the functioning of public bureaucracy. It is, however, a relevant source, and its neglect in a pragmatic society is difficult to justify when many programs and agencies are in need of data to replace guesses and hunches. . . . Using the reactions of the clientele of an agency to help in the assessment of its functioning is of great practical importance (p. 2).

Most state Extension services, including TAEX, have utilized a planning-by-objectives approach to program planning and reporting. Warner and Christenson (1984) state, "this goal-oriented system has been seen as providing the necessary information for purposes of accountability" (p. 16). It provides information related basically to county and state data on programs and clientele served. This approach provides information for monitoring the performance of personnel and programs, but does not serve as an evaluation of the impact of the agency on the general public. "The future of Extension depends on its ability to document its impact, to demonstrate its effectiveness, and to maintain a positive political climate for the organization as a whole" (Warner and Christenson, 1984, p. 19).

A number of studies dealing with the perceptions of various groups relative to the Cooperative Extension Service have been conducted, with the majority of these studies involving agricultural or Extension clientele (Jennings, 1983). The Guild Study (Guild Research, 1989) was the only documented study dealing with the general public's knowledge and awareness of TAEX, and it was limited to one metropolitan county. This study found that just over 40% of the sample of non-users (396) were aware of TAEX and its programs. The authors concluded that non-users were not generally aware of the diversity of services and programs offered by TAEX.

Cosner (1980), in a study of Oklahoma residents' perceptions of Extension, found that residents of large urban counties were less aware of Extension services than those in rural counties. A study by Warner and Christenson (1981) found that Extension in Kentucky served a larger percentage of rural residents than urban, and rural residents were more aware of Extension services than were urban dwellers.

"Extension needs to understand 'what is' before it can predict where the agency 'ought to be' in the future" (Warner and Christenson, 1984, p. 124). To chart precisely future program emphases and direction, TAEX must determine the level of the public's knowledge of its programs and services. This assessment of public awareness must include both metropolitan and nonmetropolitan areas of the State. The measurement of these distinctly different cultures will permit the design of specific strategies for future educational programming, and public education efforts as to the purpose of, and services provided by, TAEX.

PURPOSES AND OBJECTIVES

The purposes of this study were to determine the public's knowledge and assessment of the purpose and programs of the Texas Agricultural Extension Service in both metropolitan and nonmetropolitan counties, and to determine if differences in the knowledge and assessment of the organization existed between populations in metropolitan and nonmetropolitan counties.

The following objectives were used to accomplish the stated purposes of this study:

1. Determine the personal characteristics of the persons interviewed, and compare the personal characteristics of the metropolitan and nonmetropolitan samples.

2. Determine the public's knowledge and assessment of the purpose and programs of the Texas Agricultural Extension Service, and compare the knowledge and assessment of persons in metropolitan and nonmetropolitan counties.

3. Determine if a relationship existed between personal characteristics of the participants and their knowledge and assessment of the purpose and programs of the Texas Agricultural Extension Service.

METHODS AND PROCEDURES

Research Design

The research design used in this study was the telephone survey. "It is safe to say that within the last decade, surveys by telephone have surpassed the more traditional face-to-face technique in the frequency of use and in methodological developments" (Frey, 1989, p. 11). Rossi, Wright and Anderson, and Frankel and Frankel, as cited by Frey (1989), indicate that a major portion of this shift is attributed to the rising costs and declining response rates encountered in utilization of the face-to-face household survey. Frey further notes, ". . . the rise to prominence of surveys by telephone is also the result of advances in telephone technology, improvement of telephone research procedures, near complete accessibility of any population via the telephone, . . . and availability of considerable information, based on experiment and experience, on what techniques work or do not work when doing telephone surveys" (Frey, 1989, p. 11). Dillman (1978) concludes, "In light of increasing difficulties of face-to-face interviewing, it seems likely that alternative data collection methods will increase in use" (pp. 3-4). Dillman (1978) compared 24 characteristics of face-to-face surveys, telephone surveys, and mail surveys, and found the data indicated that the mail survey technique has more weaknesses than either the face-to-face or the telephone method, which he indicates are approximately equal. Considering this information, it was determined that for this study the telephone interview would provide the most accurate data and result in the highest response rate.

Population and Sample

The population for this study was all individuals, 18 years of age or older, in Texas with a household telephone during August 16 - October 26, 1993. Bureau of Census (BC) figures for total population were adjusted to allow for inclusion of only those individuals 18 years of age or older, and this figure was further revised to account for percentages of households with a telephone in Texas. The adjusted state population used in the study was 10,269,088 persons 18 years of age or older with a household telephone.

It should be noted that differences between study and state population statistics can be explained to some degree by the fact that all minority groups in Texas have a lower percentage of household telephones than Whites (Federal Communication Commission, 1993). Furthermore, minority households contain a higher number of children than White households (BC, 1991), and this fact would account for still lower numbers of minorities that would be eligible for this study.

Selection of counties included in the study samples was accomplished by using the Bureau of Census definition of a metropolitan area (MA) as being "Each MA must contain . . . a total MA population of 100,000 (75,000 in New England)" (BC, 1991, p. A-8). For the purpose of this study, the MA boundaries utilized were existing county lines. Nonmetropolitan counties were all counties with a population of less than 100,000. Using these criteria for stratification, a total of 28 counties were identified as metropolitan and the remaining 226 were grouped as nonmetropolitan counties.

Each county was assigned consecutive numbers based on its adjusted population figures. In the metropolitan group Harris County was 1 - 2,791,938; Dallas County was 2,791,939 - 4,616,321, and so on until all counties had been assigned a range of numbers. The nonmetropolitan counties were assigned a range of numbers according to the same procedure. Based on the formula for computing sample size developed by Krejcie and Morgan (1970), it was determined that a sample size of 385 would be needed for each group (metropolitan and non-metropolitan). A random number program was used to generate two sets of 385 numbers for selecting subjects from each of the two groups. All 14 Extension districts were represented in the study by 28 metropolitan counties and 145 nonmetropolitan counties.

Data Collection

Data were collected using a telephone survey process that used a two-step sequence of directory sampling. One method for drawing a sample from a directory is to employ random numbers to generate a directory page number, and then a second set of random numbers to identify a name on that page (Dillman, 1978).

A separate set of random numbers was used to move up or down the page if the first number identified was obviously a business listing, disconnected, went unanswered after 10 rings, or remained "busy" after two successive calls placed fifteen minutes apart after the initial call. Interviewers were instructed to alternate direction of movement after each successive call, and if going up or down during the calling process required them to move forward or back a page to do so as necessary.

Instrument

The survey instrument consisted of 34 questions divided into three sections. The first section dealt with personal characteristics of the respondents, the second with their knowledge of TAEX purpose and programs, and the third with the respondents' assessment of TAEX and its programs.

The instrument was designed using survey instruments from previous studies conducted by Oren (1970), Curtis (1978), Cosner (1980), Jennings (1983), and Guild

(1989), and was reviewed and revised by faculty members of the Department of Agricultural Education at Texas A&M University. Fifteen individuals were randomly selected in one metropolitan (Harris) and one nonmetropolitan county (Milam) to pilot test the instrument, conducted in August, 1993. As a result of the pilot test, further revisions were made to clarify some questions and to simplify data collection.

Survey questions related to assessment and knowledge of TAEX were tested for reliability using SPSS^x procedure RELIABILITY, and an alpha of .83 for the assessment scale and an alpha of .72 for the knowledge scale were found to exist.

Data Analysis

Descriptive statistics were used to accomplish objective one--to determine the personal characteristics of respondents. Data collected related to personal characteristics were analyzed using SPSS^x procedures FREQUENCIES, T-TEST, CROSSTABS, AND PEARSON CORR. The variables related to objective two, knowledge and assessment of TAEX, were dichotomous, and the data related to this objective were analyzed using SPSS^x procedures CROSSTABS and T-TEST. Assessment of TAEX was based on a scale of 1 to 5 (1=lowest; 5-highest) and data gathered related to assessment were examined by the ONEWAY procedure. Data collected for objective three, to determine if a relationship existed between personal characteristics and knowledge and assessment of TAEX, were analyzed using the procedures CORRELATION, CROSSTABS, and ONEWAY.

RESULTS AND FINDINGS

Findings Related to Objective One

Objective one was to determine the personal characteristics of the persons interviewed, and to compare the personal characteristics of the metropolitan and nonmetropolitan samples.

The age range for the population was 18 to 91, with an average of 47; the nonmetropolitan sample was significantly older (50) than the metropolitan sample (44). A higher percentage of females than males existed in both samples with the metropolitan sample having the higher percentage of females (64.2%), compared to 57.1% for the nonmetropolitan group. A significant, but slight, relationship was found between the samples and ethnicity, with the nonmetropolitan groups showing a higher percentage of Whites, and lower percentages of minorities than the metropolitan group. The nonmetropolitan group also contained a higher percentage of widowed and married individuals, contained fewer college graduates but more high school graduates and more individuals who had not graduated from high school than did the metropolitan sample.

Nonmetropolitan respondents had lower incomes, had more involvement in agricultural occupations, and contained more individuals who lived on a farm at some time, currently owned farm or ranch property, and owned their own homes more often than metropolitan respondents.

Findings Related to Objective Two

Objective two was to determine the public's knowledge and assessment of the purpose and programs of TAEX, and to compare knowledge and assessment of persons in metropolitan and nonmetropolitan counties.

Almost 57% of the respondents were aware of TAEX by its formal name, Texas Agricultural Extension Service, while 26% were totally unaware of TAEX. The remaining 17% recognized TAEX by one of the "unofficial" titles used in the study. A considerably higher degree of recognition was noted in the nonmetropolitan area when compared to the metropolitan area. These findings are supported by studies conducted by Cosner in 1980 and Warner and Christenson in 1984 which found that residents of rural areas were more aware of Extension services than those in urban counties.

More than 73% of the total sample were aware of a TAEX office in their county, but only 59.5% of those who knew of an office were aware of the office location. A higher percentage of the nonmetropolitan group knew of a TAEX office located in the county, and knew where the office was located.

Data from the study indicated that nonmetropolitan respondents were more likely to learn of TAEX from family and friends, while metropolitan respondents were more likely to learn of TAEX programs through mass media sources. Nonmetropolitan respondents were also found to have a higher degree of contact with all types of county agents than the metropolitan group, and over twice as many nonmetropolitan respondents (59) indicated having participated in one or more TAEX activities than did the metropolitan respondents (20). The major reason identified for not participating in TAEX activities by both metropolitan (161) and nonmetropolitan (141) respondents was being unaware of services provided.

In relation to assessment of TAEX programs, greater percentages of nonmetropolitan respondents rated TAEX higher in the area of satisfaction, effectiveness, and performance. Nonmetropolitan respondents indicated a significantly higher degree of satisfaction (3.85) than the metropolitan group (3.61). Significant differences were also found to exist between samples on the variables of effectiveness and performance. The nonmetropolitan group gave TAEX an effectiveness rating of 3.73 (5 = very effective) while the metropolitan group gave TAEX a rating of 3.50 on effectiveness. The overall performance rating by nonmetropolitan respondents was 3.81 (5 = very effective), while metropolitan respondents gave TAEX an overall performance rating of 3.43 (Table 1).

Table 1. Comparison of Mean Satisfaction with, Mean Effectiveness of, and Mean Performance of TAEX by Residence Area

VARIABLE	N	MEAN	SD	t-VALUE	α
SATISFACTION					
Metro	249	3.61	.841	-3.20	.001
Nonmetro	310	3.85	.942		
EFFECTIVENESS					
Metro	246	3.50	.792	-3.12	.002
Nonmetro	309	3.73	.924		
PERFORMANCE					
Metro	246	3.43	.778	-5.15	<.001
Nonmetro	308	3.81	.925		

In the rating of TAEX program areas, 4-H received the highest overall importance rating, followed by agriculture, community development, and home economics. In all cases the nonmetropolitan respondents rated the importance of the program areas significantly higher than did metropolitan respondents.

Findings Related to Objective Three

Objective three was to determine if a relationship existed between personal characteristics of the participants and their knowledge and assessment of the purpose and programs of TAEX. Those who lived on a farm or owned farm or ranch property were consistently more knowledgeable about TAEX, and also gave TAEX higher assessment ratings.

Occupation was found to have a significant relationship to knowledge and assessment of TAEX with those in agricultural occupations having heard of TAEX more often, having greater contact with all agent types, and participating in TAEX programs more often than those in other occupations. Older individuals were also found to be more knowledgeable about TAEX programs and services, and they tended to rate TAEX higher in the assessment areas of satisfaction, effectiveness and performance.

Educational level, ethnicity, and income level were all found to have a relationship to knowledge, with college degreed Whites with incomes in excess of $50,000 being more knowledgeable about TAEX. No relationships were found between level of education, ethnicity, and level of income and the assessment variables. However, minorities were found to be more likely to support expansion of TAEX programs, and more likely to support increased funding for TAEX.

CONCLUSIONS AND RECOMMENDATIONS

The following conclusions, programmatic recommendations, and recommendations for further research are based on the major findings of the study.

Conclusions

The nonmetropolitan sample consisted of respondents who were older, contained more females and Whites, contained fewer college graduates but more high school graduates, and more individuals who had not graduated from high school than did the metropolitan sample. Nonmetropolitan residents were also found to have lower incomes, more involvement in agricultural occupations, and contained more individuals who lived on a farm, had lived on a farm at some time, currently owned farm or ranch property, and owned their homes more often than metropolitan respondents.

Nonmetropolitan respondents were more aware of TAEX and its purpose and programs, were more likely to have contact with the local county agent, and were more likely to participate in TAEX activities. However, a lack of general public awareness existed concerning TAEX. Guild Research (1989) concluded that those who were aware of TAEX knew very little about the organization. A primary reason more of the public does not use TAEX services is due to the widespread lack of awareness among the general public of services offered by TAEX.

Nonmetropolitan respondents had a higher opinion of TAEX and its programs than metropolitan residents, as evidenced by higher ratings of satisfaction, effectiveness, performance, and importance of various programs conducted by TAEX.

Individuals who lived on a farm, had lived on a farm, owned farm or ranch property, owned their own homes, and were involved in agricultural occupations were more knowledgeable about TAEX. Those individuals who were older, had children living at home, had a higher educational level, higher incomes, and were White tended to be more knowledgeable about TAEX.

Individuals who currently lived on a farm, had lived on a farm, owned farm or ranch property, and owned their own homes rated TAEX higher than those who had never lived on a farm, did not own farm or ranch property, or did not own their own homes. Older persons were more likely to be more satisfied, and felt TAEX was more effective than younger respondents.

Programmatic Recommendations

Efforts should be made by TAEX to increase the degree of public awareness. These efforts could include, but not be limited to, increased use of public service mass media access in newspapers, radio, and television media, creating a full-time public relations specialist to promote TAEX, and creation of volunteer groups similar to the

Master Gardeners and Texas Agri-Food Masters (Vestal, 1994) to present information to the general public on TAEX. A 4-H project group should be created to train 4-H members on the history, purpose, mission, and philosophy of TAEX. The large number of 4-H members in Texas could serve as a significant network to spread the word about TAEX as they become adults.

Future Extension hiring practices should focus on employing individuals whose background and credentials would enable them to be more effective in involving nontraditional clientele in TAEX programming, and TAEX employee density (ratio of County Extension Agents to population) should be increased in metropolitan counties.

Specific efforts should be made by TAEX to involve minority groups. Minorities are predicted to be a majority of Texas residents by the year 2000, so it is critical that these ethnic groups be aware of and utilize TAEX services.

Greater efforts should be made to increase the degree of knowledge of TAEX among individuals in metropolitan counties. The nature of metropolitan and nonmetropolitan audiences differ greatly, and TAEX should design specific programs and delivery methods for the clientele in metropolitan counties.

Greater emphasis in the TAEX county plan of work should be given to promotional activities designed to increase the public's knowledge and awareness of county programs, and efforts should be made to increase participation of young adults. Specific programs designed to appeal to individuals from 18 to 40 should be created.

Recommendations for Further Research

Current users of TAEX services should be surveyed to describe the profile of the typical user of TAEX services, and to determine specific reasons why they use TAEX. This would allow TAEX personnel to design specific outreach programs that could be tailored to appeal to the individuals not currently using TAEX services.

A study of past 4-H members should be conducted to determine the degree of knowledge they have about TAEX. Information from this study could be used to produce training materials to increase 4-H members' knowledge of TAEX.

Studies of specific groups (ethnic, age, gender, etc.) should be conducted to identify why they do or do not use TAEX. Information from this type of study could be used to design programs to reach members of these distinct groups.

The effectiveness of new educational technologies should be studied to determine which will best serve the educational efforts of TAEX. Futuring studies should be conducted to help define the direction of TAEX for the coming years. Looking to and preparing for the future will help insure TAEX will be an organization that will in fact be relevant when it reaches its 100th birthday.

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SELF-PERCEIVED MOTIVATION OF MISSISSIPPI EXTENSION AGENTS AS COMPARED TO THEIR PERFORMANCE

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SELF-PERCEIVED MOTIVATION OF MISSISSIPPI COUNTY EXTENSION AGENTS AS COMPARED TO THEIR PERFORMANCE

INTRODUCTION AND THEORETICAL FRAMEWORK

Professional county extension agents' respond to many stimuli in the work situation. Some agents respond more to higher salary and rewards, while others respond to job satisfaction. The relationship between motivation and job performance has long been recognized. Therefore, many government extension programs in the world, particularly in the United States, have been established to promote positive job performance. Brundage and Mackeracker (1980) indicated that motivation is connected to levels of success in achieving desired goals and to levels of satisfaction gained from achievement. To many employers, a well motivated work force means higher productivity, performance beyond basic requirements (often without extra compensation), and reduced absenteeism in the work place.

The United States Cooperative Extension Service is an educational agency designed to mutually work among the three levels of government: local, state, and federal, to effectively achieve its mission. According to the Joint United States Department of Agriculture and National Association of State Universities and Land-Grand Colleges (USDA-NASULGC) committee on the Future Cooperative Extension Service (1983), the mission of the Cooperative Extension Service is to create better agriculture, homes, and communities by disseminating and encouraging the implementation of research-based knowledge to individuals, families, and communities.

Fetsch, Flashman, and Jeffiers (1984) also noted that there has been an increasing workload on professional county Extension agents due to budget constraints and hiring freezes. These burdensome situations often require Extension agents to have busy schedules to effectively deal with high expectations of clientele, administrative details, family commitments, and professional goals. In addition, the society has changed; as well as values, trends, and policies regarding the financial resources of the agricultural extension programs. At the same time, inflation has changed the way people spend and save money, and the population as a whole is older (Rouse, 1990). As a result, people take fewer risks.

These conditions may explain why many extension agents are responsible for two counties or discipline areas. These societal changes may influence the motivation of the agent and possibly influence his or her performance.

Statement of the Problem

Professional county Extension agents are exposed to a wide variety of problems and responsibilities, including assessing the appropriate needs of the clientele, seeking appropriate technologies to solve individual client's problems, and overcoming a lack of modern instructional materials. Considerable variation exists within and between agents, reflecting particular agro-ecological conditions, socioeconomic environments, and an administration's supervisory system. To be successful with a heterogenous clientele, county extension agents need an appropriate working environment--well-trained subordinates, modern equipment, up-to-date publications, salary commensurate with the work performed, recognition, and promotion incentives. However, the problem facing the extension services in many countries is the inability to create an environment within which the Extension agent is motivated to perform at a level commensurate with his or her efforts and salary (Benor & Baxter, 1984).

Purpose and Objectives

The purpose of this study was to determine the correlation between self-perceived motivation scores and job performance scores of professional county Extension agents of the Mississippi Cooperative Extension Service. Specific objectives were as follows:

1. Determine county agents' self-perceived motivation scores.

2. Determine county agents' performance appraisal scores.

3. Determine the relationship between county agents self-perceived motivation scores and scores received on their annual performance appraisals.

In addition, possible extraneous variables were compared to the motivation and performance scores. These possible extraneous variables were gender, race, age, level of education, length of service, area of work, job classification, length of time in the present position, salary, marital status, and number of counties worked.

Significance of the Study

The results of this study should be useful to Mississippi Cooperative Extension Service directors for improving productivity among their agents. Motivation is a significant factor contributing to the performance of individual workers (Quick, 1982). Quick (1982), also indicated that "...people don't work effectively because they don't feel motivated to do so. The cause of most on-the-job problems and failures is lack of motivation" (p. 3). Incorporation of the results of this study should contribute to more efficient personnel development.

The knowledge gained from this study could clear the way for future research to consider those variables that are related to motivation and exclude those that are not. Also, the outcome of the study will allow the researcher to appropriately replicate a similar study with extension service agents in Mali. Current knowledge about the relationship between perceived motivation scores and performance appraisal scores of professional county extension agents in Mississippi has been very limited.

METHODS AND PROCEDURES

The design of the study was descriptive-correlational. Agents' performance scores were compared to their scores on an instrument designed to determine their level of motivation.

Population and Sampling

The population for the study included 185 professional county extension personnel employed by the Mississippi Cooperative Extension Service (MCES) during 1993. A list of agents was obtained from the staff development office of the MCES. Only agents who had been employed during 1993 were included in the study because of the need of obtaining performance scores. A sample size of 115 was calculated using Krejcie and Morgan's (1970) table for determining sample size of a given population. A simple random sample of 115 agents was drawn for the study.

A request was made for agents' participation and their performance appraisal scores for 1993 to the MCES director. Permission was given to use the professional extension agents as the population of study, and the performance scores were received from the staff development department.

Instrumentation

The instrument used for the study was based on the expectancy theory of Hackman, Lawler, and Porter (1977). The developer of the instrument was contacted and granted permission to use the instrument.

The expectancy theory consists of three major components: the expectancy that effort leads to performance (E-P); the expectancy that performance leads to certain outcomes (P-O); and the valence (V), the value or weight that an individual attaches to an outcome, which can motivate behavior and influence decisions (Hellriegel & Slocum, 1992).

The instrument contained four parts. The first part requested demographic information. The second part contained questions pertaining to performance and outcomes (P-O). The third part contained questions related to the valence (V) or importance placed on outcomes. The fourth part contained questions related to effort and performance (E-P).

To use the instrument to determine level of motivation, the following process was used (Hackman, Lawler, & Porter, 1977).

Step 1. The score obtained for question 1 of part 2 of the questionnaire was multiplied by the score of question 1 of part 3. The score obtained for question 2 of part 2 was multiplied by the score of question 2 of part 3, and so on for all the questions in parts 2 and 3.

Step 2. All of the products from step were added together to get a sum of all expectancies times valences. This sum was divided by the number of pairs of questions in parts 2 and 3 to get an average performance times valence expectancy.

Step 3. The three E-P questions were added together and divided by three (number of questions) to get an average performance to effort expectancy.

Step 4. The average performance times valency expectancy was multiplied by the average performance to effort expectancy to provide a total motivation score for each person. The mathematical formula is as follows.

$$M = AVG\ ([P\text{-}O] \times [V]) \times AVG\ [E\text{-}P]$$

The instrument was pilot tested on a randomly-selected group of 20 agents not included in the sample for the study. The internal consistency for the instrument was calculated using Cronbach's alpha on the three scales of the instrument. The reliability coefficients were .83 for the performance-outcomes expectancy scale, .87 for the valence scale, and .74 for the effort-performance scale. These reliability coefficients were determined to be acceptable based on recommendations by Pedhazur (1982) for non-experimental studies. Content validity was established by a panel of experts consisting of extension educators, agricultural teacher educators, and motivation researchers.

Data Collection

An electronic mail message was sent by the Director of the MCES to request agents' participation. The data were collected using a mailed questionnaire, which had been validated and pilot tested. Ten days later a follow-up procedure initiated following the mailout of the original questionnaire. An additional questionnaire was sent to non-respondents. Ninety-two agents responded to the survey for a return rate of 81%. Because of time constraints, no further action was taken.

The primary researcher in the study submitted the names of the respondents and obtained performance scores from the MCES staff development office. Code numbers were used so the names of the agents in the study could be kept confidential.

Data Analysis

Descriptive statistics were used to analyze objectives one and two. Pearson's r correlation was used to determine the relationship between agents' self-perceived motivation scores and their 1993 performance appraisal scores (Objective 3). Analysis of variance and simple linear correlation were used to determine differences between the 11 independent variables and the 2 dependent variables: self-perceived motivation and performance scores. However, prior to performing the ANOVA, the tests of homogeneity and normality were performed. Because the homogeneity assumption was violated using the performance scores, the data were transformed using a natural logarithm or rank transformation method.

FINDINGS AND DISCUSSION

Demographic information about the participants is provided below. Following, the findings are reported based on the objectives of the study. An analysis of possible extraneous variables is also reported.

Demographic Characteristics of Respondents

There were 42 males and 50 females who responded to the study. The average work experience of the agents in Mississippi was 15 years, and they had been in the same position for an average of 9.5 years. The racial composition was 73% white and 27% African-American. Most respondents were married (78.3%).

The agents were from various occupational classifications, with 25% serving in positions with multiple responsibilities, either home economics or agriculture combined with 4-H. Table 1 contains a summary of respondents by job classification.

Table 1.

Distribution of Respondents by Job Classification (N = 92).

Job Classification	Frequency	Percent
Agriculture	27	29.3
Home Economics	24	26.1
4-H/Youth	16	17.4
Agriculture & 4-H	14	15.2
Home Economics & 4-H	11	12.0
Total	92	100.0

Table 2 shows the distribution of respondents by education level. The majority of the respondents had masters degrees.

While most of the agents had responsibilities in one county, a significant number (34%) had multiple-county assignments. The distribution of county assignments is summarized in Table 3.

Table 2.

Distribution of Respondents by Level of Education (N = 92).

Level of Education	Frequency	Percent
B.S./B.A.	15	16.3
M.S./M.A.	73	79.3
Ph.D/Ed.D	2	2.2
No Response	2	2.2
Total	92	100.0

Table 3.

Distribution of Respondents by Number of Counties Worked (N = 92).

Number of Counties	Frequency	Percent
One	66	71.6
Two	18	19.6
Three	2	2.2
Four	3	3.3
Five	3	3.3
Total	92	100.0

Respondents were asked to indicate a salary range. Almost 84% earned between $25,000 and $45,000 per year. Table 4 contains a summary of salary ranges indicated by agents.

Objective One .

The first objective was to determine county agents' self-perceived motivation scores. The average score recorded from the respondents was 26. 3 with a standard deviation of 10.8. The median was 25.0 with the upper quartile 33.0 and lower quartile 18.0. It can be concluded that 25% of the respondents had a low motivation

Table 4.

Distribution of Respondents by Salary Range (N = 92).

Salary Range	Frequency	Percent
$20,000 or less	0	0.0
$20,001 to $25,000	9	9.8
$25,001 to $30,000	17	18.5
$30,001 to $35,000	25	27.2
$35,001 to $40,000	20	21.7
$40,001 to $45,000	15	16.3
$45,001 to $50,000	1	1.1
$55,001 and above	0	0.0
No Response	5	5.4
Total	92	100.0

score, 26.1% had a low average score, 25% had a high average score and 23.9% had a high motivation score.

Objective Two

The second objective was to determine county agents' performance appraisal scores. The professional county extension agents' 1993 performance appraisal scores were excellent. All the county extension agents had a score above the expectation (90 out of a possible 140). Also, the largest percentage (42.4%) of the respondents had a performance score between 121 and 130. Six percent of the respondents had scores above 135. These results indicate either one of two occurences. One possibility is that the majority of the professional county extension agents in Mississippi implemented their programs and activities satisfactorily, according to their supervisors. The second, more likely possibility is that the instrument and/or process used is too lenient in its judgement of agents' performance.

Objective Three

The third objective was to determine the relationship between county agents' self-perceived motivation scores and scores received on their annual performance appraisals. The correlation between agents' self-perceived motivation scores and scores received on their 1993 performance appraisals was low ($r = .16$) and not statistically significant. It can be concluded that the agents' actual performances are not related to their motivation level in 1993. Another explanation could be that 1993 was a year in which agents had such consistently good performance scores that the differences in self-perceived motivation levels were not enough to indicate a relationship.

Relationships Between Possible Extraneous Variables and Motivation

The results of a T-tests revealed that agents of different gender and marital status have different self-perceived motivation levels. Agents in this study who are single (M = 31.95) showed a significantly higher self-perceived motivation score than married agents (M = 24.50). Female agents (M = 29.24) had significantly higher self-perceived motivation than male agents (M = 22.74).

The results of an Analysis of Variance (ANOVA) procedure indicated that a significant difference was found between agents' self-perceived motivation scores and job classification. A post-hoc Scheffe test identified significant differences between home-economics/4-H agents and the 4-H agents and between agriculture and agriculture/4-H agents at the . 05 level. However, no statistically significant difference was found between other groups. Table 5 contains a summary of the ANOVA procedure.

Table 5.

Analysis of Variance for Overall Mean of Agents' Self-Perceived Motivation by Job Classification (N = 91).

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	4	1183.72	295.93	2.77	.031*
Within Groups	87	9281.97	106.69		
Total	91				

* $p < .05$

Job Classification	Freq.	Mean	SD	Group
Home Ec. & 4-H	11	34.73	12.26	1
Home Economics	24	27.17	10.77	1
4-H/Youth	16	25.00	8.41	2
Agri. & 4-H	14	23.86	12.56	2
Agriculture	27	23.52	8.77	2

No differences were found by race for self-perceived motivation scores. White and African-American agents in this study appear to have similar self-perceived levels of motivation. When agents' age, level of education, length of service, and salary were compared to their self-perceived motivation scores, no differences were found.

Relationships Between Possible Extraneous Variables and Performance

The analysis of the classical assumptions of independence, normality, and homogeneity for using *a priori* tests on the agents' 1993 performance appraisal scores show that two assumptions (normality and homogeneity) were violated. Therefore, the data were transformed using a natural logarithm transformation system. This transformation allowed the data to meet the normality and homogeneity assumptions.

According to Mefferd and Sadler (1985), a period of 3 to 4 years is required for an agent to become fully effective in his or her position. Therefore, the agents were divided into two groups, those who had been employed for four years or less and those who had been employed for more than four years. A t-test revealed that agents with five or more years experience had higher performance ratings ($\underline{M}$ = 49.09) than those agents with four years experience or less ($\underline{M}$ = 24.95) (means from transformed data). This finding indicated that, in this particular group, the amount of experience that an agent accumulates will influence his or her work performance level. Agents with higher experience are likely to be better prepared to perform at higher levels than those with lesser experience in extension work. The difference could be due to a greater degree of understanding the extension system or a better understanding of the performance appraisal system within the MCES. This finding is supported by previous research (Patterson, 1984; Williams, 1991).

Other researchers have reported differences in performance appraisal scores by race (Wolfork, 1986); level of education (Mefferd & Sadler, 1985); age and job classification (Patterson, 1984); and marital status, number of children, time in present position, and number of counties worked (Williams, 1991). None of these variables were found to be statistically significantly related to job performance in this study. Also, job performance was not found to be related to salary or gender.

RECOMMENDATIONS

The following recommendations are based on the findings and conclusions of the study.

1. A longitudinal study should be conducted to examine changes in agents' motivation level related to their performance appraisal.

2. In developing programs to maintain and enhance the motivation level of professional county extension agents, marital status, gender and job classification

should be given higher priorities. In addition, more incentives should be given to agricultural extension agents and agricultural extension and 4-H agents who appear to be the least motivated groups in the Mississippi Cooperative Extension Service. However, more research needs to be conducted in order to determine appropriate incentives.

3. A future study is needed to identify if the Performance Evaluation Instrument (PEI), which was designed specifically for MCES, has a correlation with the same instrument used to measure the motivation of professional county agents in this study.

4. A significant correlation found between experience and performance should lead the MCES to consider length of work (experience) when evaluating county extension agents.

5. A similar study should be replicated at the regional or national levels in the United States to determine if the same results are obtained using large sample sizes.

6. Furthermore, it is important to note that variables such as supervisors' confidence in their employees' talents and capacities to implement programs, interrelationship between supervisor and agents, management style of supervisor, available of up-date technology, modern equipment, responsibility, and location which may be related to motivation and performance were excluded in this study, therefore, they should be explored in future studies.

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ADOPTION OF DISTANCE EDUCATION TECHNOLOGIES IN AGRICULTURAL EDUCATION: A NATIONAL DELPHI

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INTRODUCTION AND THEORETICAL FRAMEWORK

We live in a time of change. Gelatt (1993) said "Change itself has changed: It has become so rapid, so complex, so turbulent, and so unpredictable that is now called 'white water change'" (p. 10). The currents of change move so swiftly that they destroy what was considered the norm in the past, and by doing so, create new opportunities. Education, and more specifically, agricultural education is not immune to the effects of change.

The development and use of communications technologies and instructional systems currently taking place are certain to bring about change in education. Wilkenson and Sherman (1991) stated technology to deliver and receive educational programs through technologies associated with distance education has become more accessible and acceptable. Moore and Thompson (1990) pointed out many states are in the process of installing telecommunications technology to allow all levels of education to utilize distance education. Looking to the future, Pessanelli (1993) speculated technologies will allow learning to take place virtually everywhere. Recently, President Bill Clinton and Vice-President Al Gore (1993) expressed the commitment of his administration to have every school in the nation connected to the "information superhighway."

A vast number of technologies have a place in distance education strategies. While video-based technology is currently the primary method of instructional delivery, a variety of others are used as well (Wilkenson & Sherman, 1991). Many desktop computer based delivery systems show great promise. Documents, pictures, videos, sounds, and multimedia presentations can be accessed through computer networks such as the World Wide Web (Hill, 1993). Salvador (1994) described how "pen computing," where an electronic pen used with a LCD screen pad, is being used in a middle school to connect students to an instructor and to one another. The Virtual Online University, as reported by Marklien (1995), will connect faculty from universities around the world to more than 3500 students.

Despite these developments, challenges persist. Faculty and administrators consider these changes in educational delivery systems to be threatening (Beaudoin, 1990). Such concerns focus on poor attitudes toward distance education, suspicion of the nontraditional, and required changes in instructional methods (Dillon, 1989). Miller and King (1994) were able to identify 16 obstacles that exist in the delivery of distance education to secondary agricultural education programs. However, Moore (1993) encouraged educators to look beyond these challenges and consider the vast opportunities distance education technologies and methodologies facilitate.

The opportunities for agricultural educators are numerous. Agricultural educators will be able to deliver programs to broader audiences including learners of all ages and from diverse backgrounds. It will be possible to design and research distance education methodologies and assist colleagues in other areas of agriculture to enhance their teaching capabilities. Promise exists for partnerships and collaborative efforts with agricultural extension services and agribusinesses like never before. However, for these opportunities to develop from promise to reality, we need to explore this evolving methodology of distance education, determine specific benefits it offers to our profession and obstacles it presents, and clarify a vision for the future.

PURPOSE AND OBJECTIVES

The purpose of this study was to develop a consensus to provide focus and direction for future research activities concerning the adoption of electronic communication, information, and imaging technologies for instructional use in agricultural education settings. The specific objectives were:

1. Identify the positive effects the adoption of electronic communication, information, and imaging technologies will have upon the instructional process.
2. Identify the major obstacles that must be overcome in the adoption of these technologies.
3. Identify the technologies that hold the most promise for instruction at both the secondary and post secondary levels.

METHODS AND PROCEDURES

The conceptual model for this study was taken from Buriak and Shinn (1989) who used a Delphi approach involving expert opinion leaders to identify a research agenda for agricultural education. The Delphi method was selected for its ability to identify, and even create consensus among expert opinion leaders (Sackman, 1974). While decisions should be based upon a developed knowledge base, if one is unavailable, the opinions of experts are an acceptable alternative (Helmer, 1966). Buriak and Shinn (1989) suggested a Delphi model in which the study progresses in separate phases, "each phase moving closer to satisfying the objectives" (p.14). The phases of this research project are described below.

Phase I: Identification of the Panel

The Delphi method is heavily reliant upon the proper selection of an expert panel (Dalkey, 1969; Sackman, 1974). In order to identify an appropriate panel of experts, 37 names were purposely selected by an advisory committee from appropriate sampling frames. These frames included the 1993 Directory of Teacher Educators in Agriculture and the 1993 Ag Teachers Directory. Experts were selected on the basis of recognized involvement with programs utilizing these technologies. A request was sent to each of these people on March 31, 1994. They were asked to identify expert opinion leaders to serve on a Delphi panel to examine how the new electronic communication, information, and imaging technologies will be used to improve instruction in the years ahead. They were also informed that panel members would be asked to identify the decisive obstacles that must be overcome in the process of adopting these technologies and the consequential instructional benefits derived following their adoption.

These 37 individuals nominated 61 members to serve on the Delphi panel. Only two panel members were duplicated during the identification process, indicating that there is not a consensus among opinion leaders as to expertise in this field. All 61 identified panelist were therefore invited to participate and informed of the commitment required to complete the study.

Of the 61 panelists invited to participate and mailed the 1st round instrument, 50 accepted and returned the instrument. Of these 50, 35 were university faculty members and 15 represented industry, state teacher supervisors, and secondary teachers of agriculture and technology courses. University faculty were primarily from departments of agricultural education, although agricultural extension, communications, and technology departments were represented as well. Forty-two of these 50 panelists completed the second round, and 38 completed the third. According to studies completed by the Rand Corporation, questions of process reliability when using the Delphi method are satisfactorily answered by a panel size larger than 13 (Dalkey, 1969).

Phase Two: Collection of Opinion

In the first round, panelists were asked to offer their response to four open-ended questions. These questions reflected the specific objectives of the study, and remained unchanged throughout the study.

Phase Three: Determining the Value of Opinion

In the second round, panelists were asked to review their own and the other panel members' responses and assign a value rating based upon the level of agreement with the item. A seven-point Likert scale was employed with items ranging from a 1 for "Strongly Disagree" to a 7 for "Strongly Agree." Space was provided at the end of each section for panelists to suggest new ideas. Panelists were also encouraged to further refine existing statements by adding comments and suggestions.

Phase Four: Working Toward Consensus

Based upon the suggestions and comments from the second round, new items and parenthetical clarifications to several existing items were added in the creation of the third round instrument. Frequency distributions were used to further refine Round II responses. Only those statements on which 66% of the panel members selected "Somewhat Agree" (rating of 5), "Agree" (rating of 6) or "Strongly Agree" (rating of 7) were retained for the third round. In the third round panelists were asked to re-evaluate items. Each panelist again indicated his/her level of agreement with the items, using summary data from Round II responses as a guide to a new rating.

Phase Five: Analyzing the Data

Only descriptive statistics were used due to the sample selection process. Means and frequency distributions and percentages were calculated for each statement on the third round instrument. The fact that only small changes in the frequencies of retained items were found between the second and third rounds indicated that a consensus had been reached and the Delphi process could conclude.

FINDINGS

Improving Instruction

Panelists suggested 21 ways in which these technologies will improve instruction (see Table 1). Their responses tended to cluster around four areas: 1) an increase in the availability of educational opportunities for students, 2) improved informational resources for faculty and students, 3) more effective instructional materials, 4) more convenient delivery methods for instructors.

Obstacles

Panelists achieved consensus on 13 obstacles to be overcome in the process of adopting these technologies (see Table 2). These obstacles tended to cluster around five areas: 1) lack of time, 2) lack of a formalized reward system for faculty, 3) lack of technical support, 4) cost of the equipment, and 5) lack of properly designed facilities.

Promising Technologies

There was little difference between the technologies identified by the panelists as being most promising for the secondary and post-secondary levels. They achieved consensus on 13 statements for secondary programs (see Table 3), and 19 for post-secondary (see Table 4). In general, the panelists identified technologies that tended to cluster around four areas: 1) Distributed information systems, 2) Computer based information systems, 3) Computer assisted telecommunications systems, 4) Graphical image production and display systems.

Panelists reserved only one technology for the secondary level, interactive video. Panelists identified several technologies solely for the post-secondary level; these included: 1) There will be great variation in the adoption of these technologies by the state, as well as by individual institutions; 2) Electronic advising will become an important and accepted avenue for students; and, 3) On-line database searches, satellite delivery of audio visual materials, and multimedia authoring systems are promising technologies.

Some items eliminated in the second and third rounds were also notable (see Table 5). Panelists did not achieve consensus on many items, most of which clustered around three areas. Teaching methodology or pedagogy, the technology adoption process, and educational institution administration.

Table 1
Improving Instruction Through Technology

Statement	Percent "Agree" or "Strongly Agree"
They will provide teachers with additional teaching aids to reach and meet the needs of the diverse learning styles of students.	100.0
Teachers will have greater access to information resources.	100.0
Students will be able to take courses at many institutions.	91.9
A wider range of visual materials will be utilized.	89.2
Student's access to instruction will be enhanced.	86.5
Experts of all kinds will be more available for both students and teachers.	86.5
Textbooks will be available on CD ROM.	86.5
Teachers will communicate with their colleagues more.	83.8
Experts of all kinds will be more available, and more utilized, by both students and teachers.	83.8
They will reinforce learning by providing students with relevant, timely, experiences.	78.6
Instruction will become more individualized.	77.6
Teachers will collaborate over distance on curriculum and research.	75.8
They will increase the opportunities for business/education partnerships.	75.7
Feedback to learners will be quicker and more specific.	73.0
Experts of all kinds will be more utilized, by both students and teachers.	73.0
Direct communications with content experts will be utilized instructionally.	73.0
Multimedia will be more effective in the instruction of abstract concepts.	73.0
Travel time for both student and instructors will be reduced.	70.3
Students will be able to choose courses based upon quality, regardless of the relative geographical location of student and instructor.	70.3
Realistic simulations and or virtual experiences will be utilized instructionally.	70.3
Course materials will be more easily updated.	67.6

Table 2

Obstacles to Overcome in the Process of Adopting Distance Education Technologies

Statement	Percent "Agree" or "Strongly Agree"
Educator apathy, most teachers are not using the technologies available now.	89.2
A lack of commitment by educators to spend the time to master the use of these technologies.	86.5
The level of preparation necessary for the instructor to utilize the technologies consistently.	83.8
The lack of administratively provided time, like professional development leave, to learn to use the technologies.	81.1
The lack of a reward system that encourages staff members to utilize the technologies.	78.4
The resistance to change by educators	78.4
The lack of administratively provided time, not leave, just time during the day to attend workshops.	73.0
The lack of support services to maintain hardware.	73.0
The awareness level of administrators and legislators.	73.0
The lack of coordination of effort in securing these technologies.	73.0
The lack of access to state of the art hardware.	73.0
The lack of availability of facilities designed to utilize the new technologies.	70.3
The cost of the hardware.	67.6

Table 3
Promising Technologies for Secondary Programs in Agricultural Education

Statement	Percent "Agree" or "Strongly Agree"
Interactive computer software programs.	94.6
Presentation software.	94.6
Interactive multimedia CD ROM based computer programs.	86.5
Electronic mail used to communicate among teachers.	86.5
Computers in all classrooms.	86.5
LCD Panels and projectors to display information.	83.8
Computer graphics programs for landscaping and design, CAD.	81.1
Video tapes.	81.1
Interactive Video.	78.4
Electronic mail used for students to communicate with other students.	78.4
Multimedia delivered over a network, like MOSAIC.	78.4
Computer assisted telecommunications and data transmission using the Internet.	75.7
Two way interactive television.	75.7

Table 4
Promising Technologies for Post-Secondary Programs in Agriculture.

Statement	Percent "Agree" or "Strongly Agree"
On-Line database searches using Gopher, Veronica, After Dark, Lexus/Nexus.	97.3
Presentation software.	97.3
LCD Panels and projectors to display information.	94.6
Multimedia delivered over a network, like MOSAIC.	94.6
Computer assisted telecommunications and data transmission using the Internet.	92.1
Interactive computer software programs.	91.9
Electronic mail used to communicate among Professors.	91.9
Interactive multimedia CD ROM based computer programs.	91.6
Electronic mail used for students to communicate with other students within and between campuses.	89.2
Distance Learning at this level will vary greatly by State.	89.2
Distance Learning at this level will vary greatly by Individual Institution.	89.2
Two way interactive television.	81.1
Some advising will be done electronically.	78.4
Satellite delivery of audio visual materials.	75.7
Computers in all classrooms.	75.7
Video tapes.	75.7
Computer graphics programs for landscaping and design, CAD.	71.1
Multimedia authoring systems.	71.1
Electronic advising will become an important and accepted avenue for students.	67.6

Table 5

Sample of Statements Not Retained

Statement	Percent "Agree" or "Strongly Agree"
Benefits not retained:	
The presentation of information will be greatly improved.	65.8
Traditional educational "service areas" or "boundaries" will overlap, and competition between educational institutions will increase.	64.9*
The utilization of information will become more important than its memorization.	64.9*
Students will collaborate with others at distant sites in real time.	62.2*
The presentation of information will be greatly improved.	62.2*
They will increase the equity of course offerings among educational institutions	60.6
Student interest will be increased.	60.5
Instruction will become highly specialized.	57.8*
They will increase the number of students served by an instructor.	55.3
It will fundamentally change the teacher/student roles in education, enabling student centered education with the teacher assuming the role of coach.	50.0
The authenticity of instruction will be increased.	42.1
Education will become more economical.	26.4
Lesson preparation time will be reduced.	5.3
Obstacles not retained:	
The educator's fear of the technologies.	63.2
The high cost of network connections.	62.2*
Lack of vision by administrators.	60.4
The resistance to change by administrators.	57.9
The increased cost to students for the ability to utilize these technologies.	55.3
The paradigm of the instructor as the expert, using teacher directed learning.	52.6
Competition among universities for the same learners.	42.2
The lack of student training in the use of the technologies.	34.2
Student fear of the technologies.	5.2
The lack of student interest.	5.2

* Items removed in Round III. All other were removed in Round II.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

1. Electronic communication, information, and imaging technologies will improve how we teach in agricultural education settings. They will allow us to reach more students, more effectively, with better information.

2. Faculty and administrators consider the time required to become proficient in the use these technologies to be an obstacle to their use. Other obstacles include a lack of commitment for the use of these technologies to improve instruction and a lack of faculty support to the adoption of these technologies. A lack of funding and the cost associated with these technologies were also cited as obstacles.

3. This research supports Dillon's (1989) finding that a lack of incentives is a primary reason faculty do not support or adopt distance education technologies and methodologies.

4. While no one technology was identified as being most promising for either secondary or post-secondary agricultural education, the computer based telecommunications technology of all types is a clearly dominate group. Post secondary agricultural education will focus upon networked applications such as e-mail and the World Wide Web. Secondary agricultural education programs will focus upon "stand alone" applications such as CD-ROM and other interactive software programs.

Recommendations

1. This study indicates agricultural educators are knowledgeable and hold strong opinions about distance education and its related technologies. Therefore, agricultural educators should be included in the planning, development and implementation of distance education programs.

2. Due to the variety of technologies suggested, a priority assignment should be completed regarding the selection and use of distance education technologies at individual institutions.

3. Because of the frequency with which personnel outside the profession of agricultural education were suggested as resource persons, partnerships should be developed within and between institutions to plan for the use of these technologies.

4. Adjustments of faculty assignments and modification of faculty reward systems should take place to encourage the adoption of these technologies and methodologies.

5. Research should be conducted to identify specific rewards and incentives to motivate faculty to commit and support the adoption of these technologies.

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NEEDS ASSESSMENT OF AGRICULTURE FACULTY REGARDING DISTANCE EDUCATION

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INTRODUCTION AND THEORETICAL FRAMEWORK

With rapid advancements in telecommunications technology in recent years, a great deal of interest has developed about distance education and its uses by colleges of agriculture. However, the research that has been conducted concerning distance education for agriculture programs has been limited. During the five year period between 1989 to 1993, only seven studies dealing with the topic of distance education were reported at the National Agricultural Education Research Meeting (Arrington, 1990; Martin, 1991; Mundt, 1992; Scanlon & Bruening, 1993; Lawver & Terry, 1994).

A valuable point from which to view issues related to distance education is to recognize the parts from which it is composed. Gamble and Gamble (1989) proposed a model for any type of communication containing four primary parts. As illustrated in Figure 1, the first component is the sender, or source of information. The sender can be a person, group of people, or an entire institution. The second component is the message -- the information to be communicated. The third part is the channel, or method by which the message is communicated. Finally, the fourth part is the receiver -- the person, persons, or institution to which the message is targeted. These same four components are important in evaluating the potential success of distance education efforts for agricultural educational programs. Overall, distance education research has focused primarily on the two former factors with more limited evaluation of the latter two.

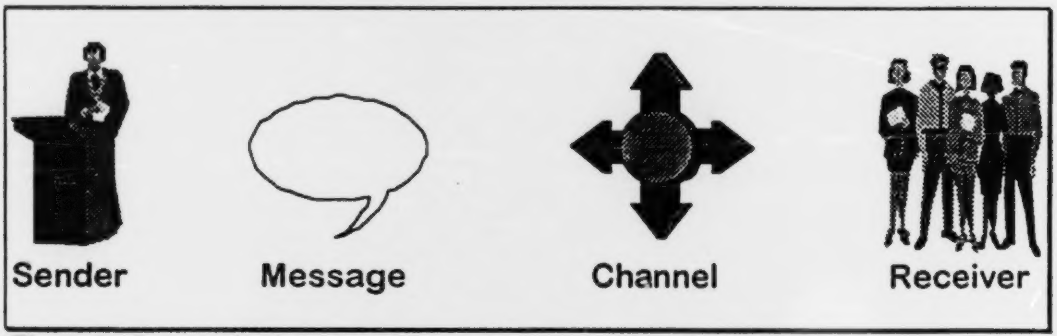


Figure 1. Communications model

New developments in communications technologies have brought research regarding the methods of delivery, or the channel, used in distance education. Much attention has been directed to the technology itself. The concept of the "information super-highway" has been the subject of countless articles in the popular press. Currently, there is a barrage of television commercials being aired by telecommunications giants such as AT&T, MCI, and IBM promoting the benefits of these new technologies to help people work, learn and recreate more effectively. Jackson (1994) stated the increase of available telecommunications technology has provided educators of agricultural subject matter unique opportunities.

A great deal of concern has also been directed toward learners, or the receivers of distance education programs. Dillon and Walsh (1992) pointed out "the dominate theme of distance education research has been linear; research has focused primarily upon learning outcomes, learning characteristics, and learner attitudes" (pg. 5). However, other factors must be considered as well. That is, there are other aspects of this communications process that must be considered.

The sender of the information is another critical factor of the communications model and must be investigated to ensure success of distance education programs. Newcomb (1990) pointed out that technology for distance education is ready; however, such programs in agriculture will not success until educators are as ready as the technology. McNeil (1990) stated that while the implementation of new technologies is growing, the rate of adoption is quite slow. A reason commonly given for this disappointing rate of adoption is negative attitudes and resistance of college faculty (Gunawardena, 1990). However, as Dillon and Walsh (1992) contend, faculty, the persons responsible for program design and delivery, have been largely neglected by distance education research. It is important to identify obstacles and challenges facing faculty in colleges of agriculture related to their work with electronic teaching technologies to ensure the success of distance education efforts.

PURPOSES AND OBJECTIVES

The purpose of this study was to provide baseline data and focus for the improvement of instruction in agriculture through the utilization of electronic technologies used in teaching for a college of agriculture. The objectives, stated as questions, were:

1. What are selected personal and professional characteristics of the teaching faculty of a college of agriculture at a land grant university?
2. What is the perceived level of competence members of the teaching faculty of a college of agriculture have in the use of electronic technologies used in teaching associated with distance education?
3. How important do teaching faculty members perceive that these technologies are or will be in teaching and learning?
4. What is the perceived availability of equipment, facilities, and training for faculty to use these technologies?

METHODS AND PROCEDURES

Population

The population for this study was all teaching faculty in the college of agriculture of a land grant university. A census of the population was surveyed. Department heads were asked to provide a complete listing of faculty members in their department who held teaching appointments. With all departments reporting, there was determined to be a total of 314 faculty members with teaching appointments.

Instrumentation

The instrument used to collect data was a three part questionnaire designed by the researchers. Part I consisted of forty statements with a 7 point Likert-type response scale.

The response choices were: 1 = "Strongly Disagree," 2 = "Disagree," 3 = "Somewhat Disagree," 4 = "Neither Agree nor Disagree," 5 = "Somewhat Agree," 6 = "Agree," 7 = "Strongly Agree." A seven point scale was chosen so categories could be included that would more accurately identify respondents who did not hold strong opinions. The researchers considered many of the faculty would not hold strong opinions on some statements due to a lack of information about, and or exposure to, these relatively new technologies.

Items in Part I were designed to measure the following:

- level of competence of faculty members in the utilization of technologies associated with distance education.
- perceived value these technologies have or will have to the teaching of agriculture.
- perceived availability of equipment, facilities, and training related to the use of these technologies.

Part II of the questionnaire was designed to identify the selected personal and professional characteristics of the respondents. The demographic variables included in the survey were gender, age, the number of undergraduate and graduate courses the faculty member taught per year, and the total annual enrollment in those courses.

Part III provided an opportunity for the respondents to add their comments concerning improvement of their use of distance education technologies. This part of the questionnaire consisted of a single open-ended question.

Content validity of the instrument was established by a panel of experts made up of faculty members from the Department of Agricultural Education and the Department of Education Human Resource Development. A pilot test of the instrument was completed by selected faculty members from the two departments. Minor changes in the instrument were made based upon evaluation of the pilot test and suggestions of the panel of experts.

Collection of Data

All teaching faculty in the college were sent a copy of the questionnaire along with a cover letter describing the project via campus mail. Of the 314 survey instruments sent out, 234 were returned within two weeks, for an effective response rate of 74%. A reminder was sent to non-respondents via campus mail and a third call was made via e-mail four weeks after the initial mail out. Those faculty without valid e-mail address were contacted via telephone. In each case, additional instruments were supplied upon request. In all, 256 survey instruments were returned for a final effective response rate of 81.5%. Survey and follow up procedures were in accordance with those outlined by Dillman (1978).

Analysis of Data

Data were analyzed using SPSS® software on an IBM 3090 mainframe. Descriptive statistics were calculated for each variable. An attempt to control non-respondent error was made by comparing the data from early and late respondents as suggested by Miller and Smith (1983). No significant differences were found between the groups. Reliability was established by calculating Cronbach's Alpha. The alpha for items related to perceived level of competence was .61; for items related to perceived level of importance was .65; and for items related to perceived availability was .68.

Frequencies and percentages were used to summarize agreement or disagreement with statements related to competence, importance, and availability. Only those respondents who indicated "agree" and "strongly agree" or those indicating "disagree" or "strongly disagree" are reported in the findings. Thus, those respondents who indicated "somewhat agree," "neither agree nor disagree" or "somewhat disagree" were considered not to have a strong opinion about a given statement.

RESULTS

Personal and Professional Characteristics of Teaching Faculty

The population of this study was all teaching faculty in the college of agriculture at a land grant university. More than 92% were male and fewer than 23% were younger than 40 years old.

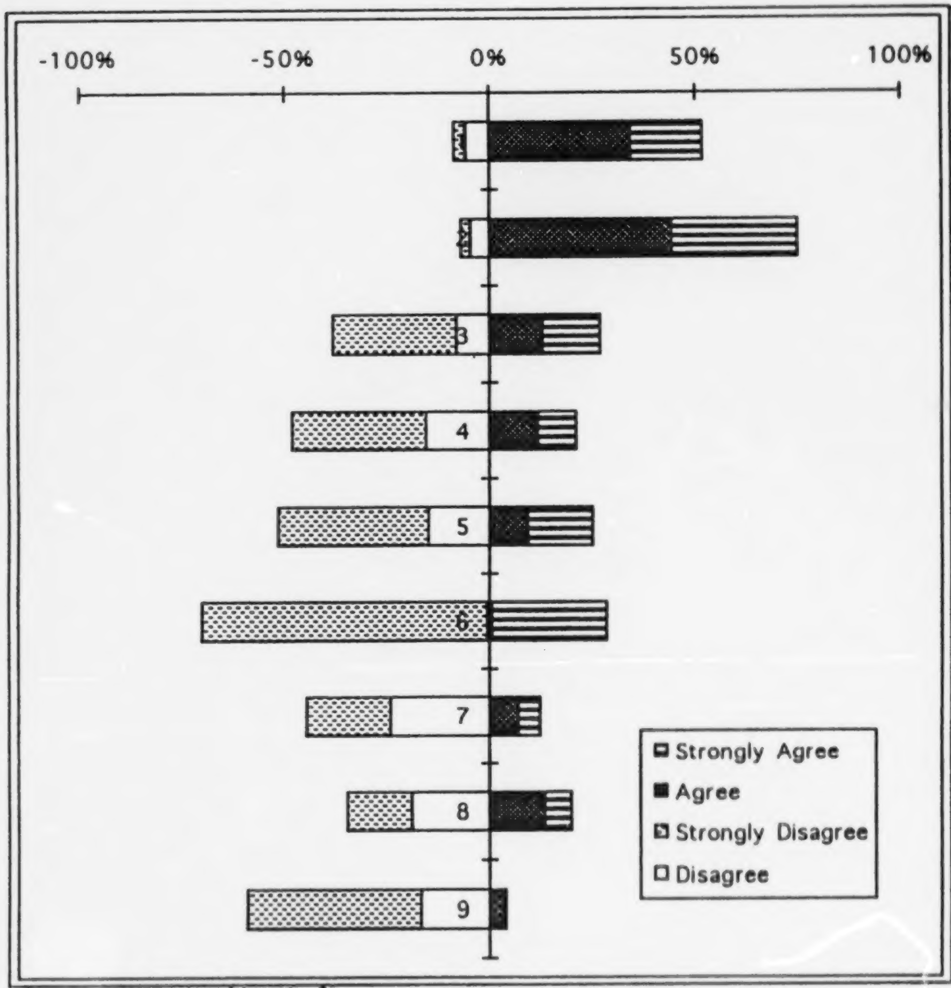
Almost 64% of the faculty reported they teach one or two undergraduate classes per year with 15.6% reporting they teach no undergraduate courses. Twenty-five percent do not teach any graduate classes while 55.5% teach one graduate class per year. The average number of students taught annually was 117 with a range from 6 to 1000.

Competence

Nine items on the questionnaire were used to measure the perceived level of competence members of the teaching faculty of the college of agriculture had in the utilization of electronic teaching technologies associated with distance education.

Almost three-fourths of the teachers believed fax machines are not difficult to use. More than 50% of the faculty indicated they agreed or strongly agreed facsimile machines are easier to use than mailing a letter while less than 10% disagreed or strongly disagreed. Only 4.3% marked at least agree when asked if they sent their most important correspondence by e-mail. Nearly 60% marked disagree or strongly disagree. More than one-fourth agreed they could teach others how to use the campus e-mail system, while 39% disagreed or strongly disagreed with that statement.

The faculty were generally negative concerning their competence in producing instructional materials and using appropriate teaching methodologies for distance education. Nearly half of the respondents indicated they were not involved in the creation of multimedia instructional materials for their courses. Slightly more than 52% indicated they could not teach others how to use presentation graphics software, and 71.1% stated they did not produce their own color overhead transparencies. When asked if they were familiar with teaching methodologies used in teaching courses over distance, 44.6% disagreed or strongly disagreed and 12.4% agreed or strongly agreed. Less than 20% indicated they could confidently deliver their course over distance, while 34.6% indicated they could not. These data are illustrated in Figure 2.



1. Using a fax machine is easier than mailing a letter.
2. Fax machines are not difficult to use.
3. I can teach others how to use the campus e-mail system.
4. I am involved in the creation of multimedia instructional materials for my course.
5. I can teach others how to use "presentation" software packages.
6. I produce my own color overhead transparencies.
7. I am familiar with the methodological considerations of teaching courses over distance.
8. I could confidently deliver my course over distance, utilizing the TTVN or some other bi-directional television network..
9. I send my most important correspondence by e-mail.

Figure 2. Perceived level of competence

Importance

Fifteen items were used to measure the importance teaching faculty believed technologies associated with distance education have or will have to teaching agriculture. Faculty members recognized the importance of e-mail with the vast majority (80.7%) agreeing they would put their e-mail address on their business cards. They were also positive concerning the value of electronic bulletin boards. Nearly 36% marked agree or strongly agree for the statement, "participation in electronic bulletin board services offers great benefits."

As illustrated on Figure 3, opinions were mixed concerning the effect of electronic communications technologies. Nearly 57% agreed these technologies would drastically alter how we teach in the next five years with only 6.3% in disagreement. However, 39% disagreed that these technologies would change what we teach in the same time period. Some 26% agreed with that statement.

Nearly one-third of the respondents agreed that course materials could be improved by incorporating sound with visual aids. In response to a statement about the value of animated graphics increasing student interest and retention, 43.7% agreed and 4.8% disagreed. More than one-third agreed the use of full-motion video increases student interest and 58.6% agreed electronic information technologies will provide students with instantly available supplemental course materials. Fewer than 30% of the respondents had a strong opinion about students expecting more graphical learning experiences today. Slightly more than 25% agreed with that statement and only 1.2% disagreed.

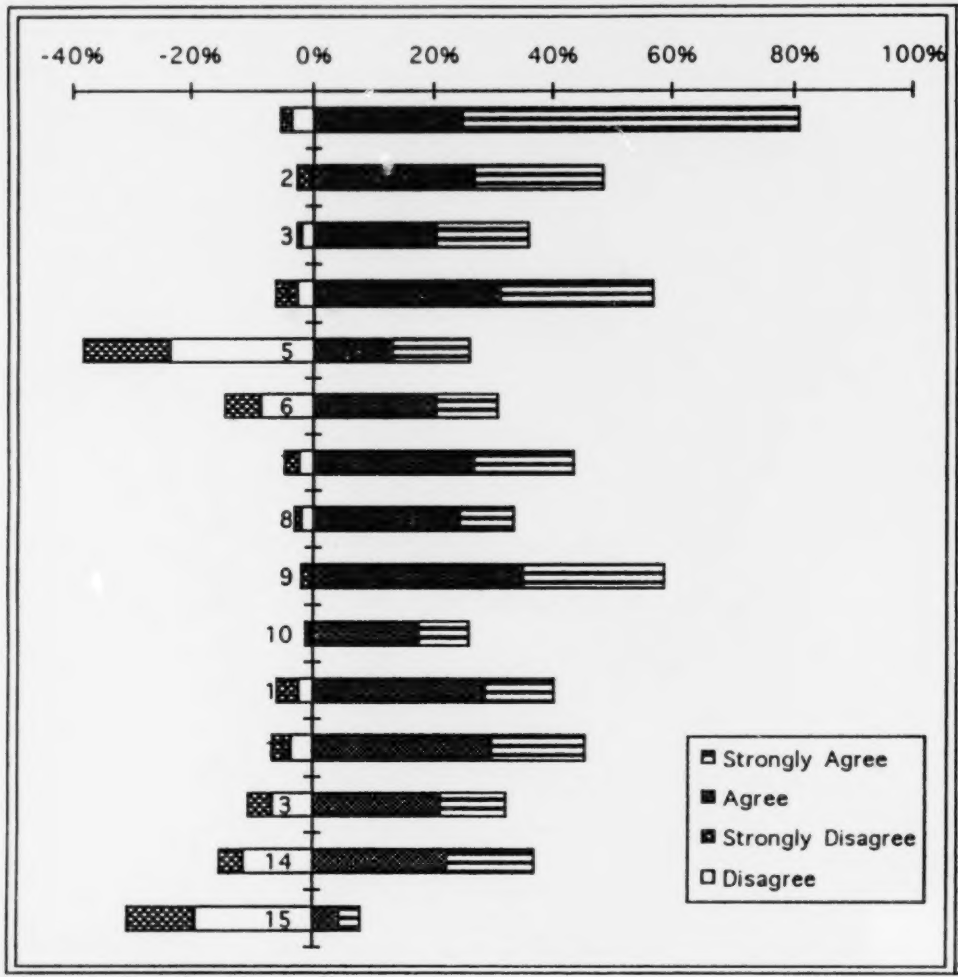
More than 40% believed electronic information technologies were valuable in graduate and undergraduate courses. Thirty-seven percent agreed or strongly agreed learning requires face-to-face interaction between teacher and student while more than 15% disagreed or strongly disagreed. More than 30% agreed there are not too many "bells and whistles" used in teaching today.

Availability

Ten items were used to measure the perceived availability of equipment, facilities, and training for faculty to use technologies associated with distance education. Faculty opinions were negative on all but one of the items.

Concerning the availability of equipment, 79.9% of the teachers indicated they are connected to electronic mail in their office and nearly the same percentage indicated they were not connected at home. More than 45% disagreed or strongly disagreed that the equipment needed to produce and display multimedia course materials is readily available. Although there is a university-wide, published memo describing the procedure to secure electronic presentation equipment, nearly half of the faculty members were not aware of this procedure. More than 57% disagreed that their classrooms were designed to support the use of such teaching aids.

Teaching faculty members were asked about the availability of training and assistance in the use of instructional technologies. More than one-third disagreed that there is ample opportunity to secure faculty development training to use multimedia equipment.



1. I would put my e-mail address on my business cards.
2. Electronic database management systems, like Gopher searches, the World Wide Web, and Mosaic are convenient ways to access information.
3. Participation in electronic bulletin board services offers great benefits.
4. Electronic communications, information, and imaging technologies will drastically alter *HOW* we teach in the next five years.
5. Electronic communications, information, and imaging technologies will drastically alter *WHAT* we teach in the next five years.
6. I think most course materials would be improved by incorporating sound with the visual aids.
7. Animated graphics increase student interest and retention.
8. The use of full-motion video increases student interest.
9. Electronic information technologies will provide students with instantly available supplemental course materials.
10. Students today expect a more graphical learning experience.
11. Electronic information technologies are important in graduate courses.
12. Electronic information technologies are important in undergraduate courses.
13. It is important that I incorporate appropriate electronic information technologies in the courses I teach.
14. Learning requires a face to face meeting between teacher and student.
15. There are too many "bells and whistles" being used in teaching today.

Figure 3. Perceived level of importance

Nearly 70% had no strong opinion about the availability or faculty training workshops on distance education. Of those with a strong opinion, 22.1% disagreed with the statement and 8.8% agreed. Nearly the same results were obtained concerning the availability of technical assistance in using distance learning technologies. Thirty-nine percent were not aware of a center location for assistance in using multimedia equipment. When asked if time spent developing multimedia materials was valued by their department, 41.4% disagreed and 6.4% agreed (see Figure 4).

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

1. A teaching faculty member in the college of agriculture is male and over forty years of age.

2. Each faculty member teaches one to two undergraduate classes and one graduate class per year with an average annual enrollment of 117 students.

3. Teaching faculty in the college of agriculture lack competence in the use of electronic technology used in distance education.

4. Faculty lack confidence in their ability to use appropriate teaching methodologies to deliver their courses over distance.

5. Faculty consider the use of electronic technologies to enhance their teaching to be useful and important.

6. Faculty believe development and use of electronic teaching technologies will change how they teach, but will not change what they teach.

7. The faculty agree electronic teaching technologies contribute to teaching graduate and undergraduate courses; however, there is a need for face-to-face interaction between teacher and student.

8. The teaching faculty in the college of agriculture consider their access to equipment and facilities needed to develop and use electronic teaching technologies to be limited.

9. The teaching faculty in the college of agriculture consider their access to training and assistance needed to develop and use electronic teaching technologies to be limited.

10. Faculty do not believe time and effort expended to develop multimedia course materials is appropriately valued in their departments.

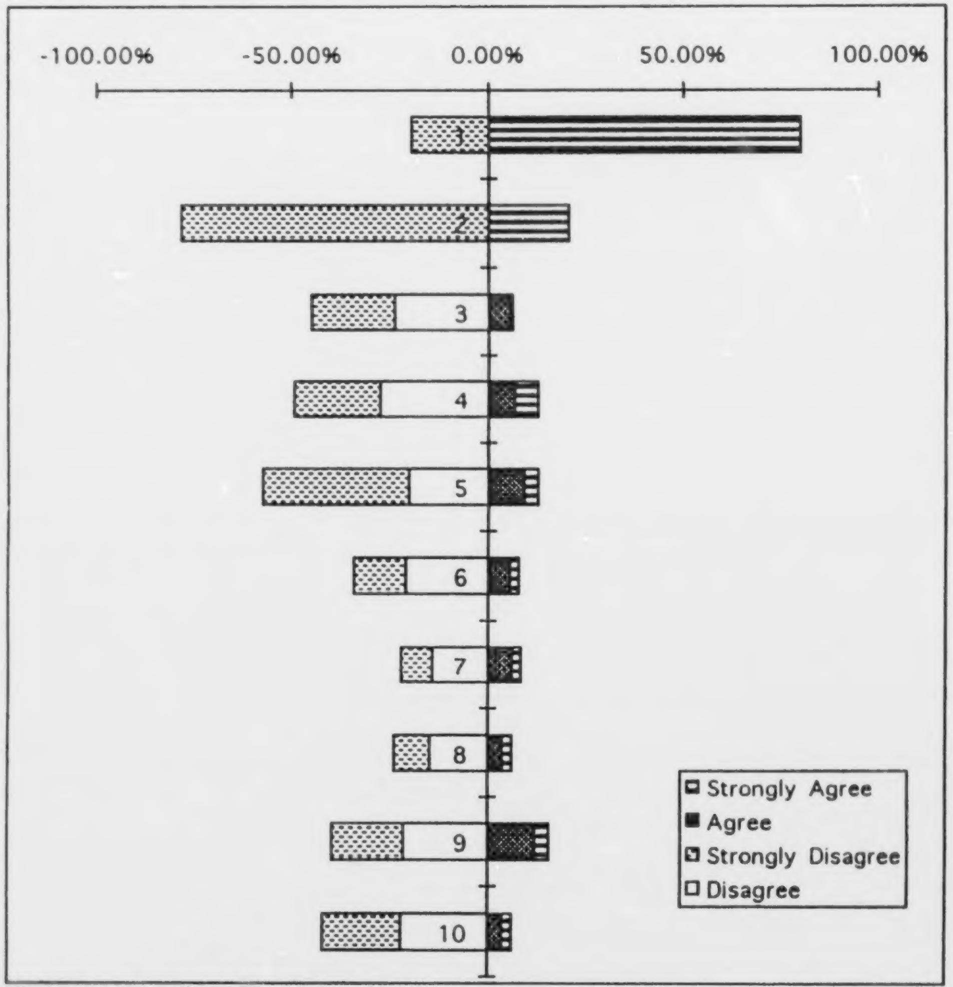


Figure 4. Perceived level of availability

1. I am connected to e-mail at the office.
2. I am connected to e-mail at home.
3. The equipment needed to produce and display multimedia course materials is readily available.
4. I am aware of the necessary procedure to secure electronic presentation equipment for classroom use at this university.
5. I have access to a classroom that is designed to support the use of multimedia teaching aids.
6. There is ample opportunity to secure faculty development training on using multimedia equipment.
7. There are enough faculty development workshops on distance learning methodology.
8. Technical assistance in utilizing distance learning technologies is readily available.
9. I am aware of a central location to which I can turn for assistance in using multimedia equipment.
10. The time spent developing multimedia course materials is equitably valued by my department.

Recommendations

1. Programs to help teachers to become proficient in the use of electronic teaching technologies should be developed. These programs should focus upon equipment readily available to the teaching faculty.

2. Efforts should be increased to make teaching faculty aware of training workshops, equipment, and technical assistance available to help them develop and use electronic teaching technologies.

3. Classrooms should be modified and additional electronic teaching equipment should be purchased to enhance the teaching of graduate and undergraduate courses.

4. The faculty reward system needs to formally include rewards and incentives for the special efforts necessary for successful distance education programs. Modifications in the tenure and promotion process should be developed to cultivate improvement of instruction through the adoption of these technologies.

5. Further clarification of the obstacles to the adoption of these technologies is required as well as identification of appropriate rewards and incentives.

6. A study similar to this should be conducted using extension specialists and agents involved in presenting educational programs.

7. Research should be conducted to determine subject matter that can best utilize these technologies and methodologies.

8. Further evaluation should be conducted concerning the impact these technologies have upon various teaching and learning styles and how these technologies affect learning.

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SCIENCE CREDIT FOR AGRICULTURE: PERCEPTIONS OF ARKANSAS AGRICULTURE TEACHERS

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INTRODUCTION AND THEORETICAL FRAMEWORK

According to Moore (1994, p.1), "The purpose of agricultural education research is to find answers to meaningful questions and problems." The research reported in this paper was sponsored by the Arkansas Vocational Agriculture Teachers Association (AVATA) in order to provide information needed to solve a significant problem facing agricultural education in Arkansas.

Problem Statement

During their July 1994 business meeting, AVATA members voted to seek science credit for agriculture. An *ad hoc* committee, composed of six teachers, was appointed and charged with the responsibility of exploring methods of securing science credit for agriculture.

The committee met for the first time in August 1994. Also participating in the meeting were the executive director of the state advisory council on vocational-technical education, four state agricultural education supervisory staff members, and a teacher educator. During the course of the meeting, participants realized that meaningful plans could not be made until more was known about teachers' perceptions and preferences concerning science credit for agriculture. Also, committee members expressed the need for more information about the science content currently taught in agriculture, and about the teachers' academic preparation in science and mathematics. Due to this need for information, the AVATA requested and funded this study.

Theoretical Framework

Hammonds (1950) provided a compelling argument for teaching agriculture as a science. According to Hammonds:

> The "organized body of knowledge" we call the science of agriculture is deeply rooted in the sciences that contribute to agriculture. If we strip away from agriculture the portions of other sciences that bear upon it, we perhaps do not have left a science of agriculture. To teach agriculture as a science is to recognize that it is a science. (p.5)

More recently, the National Research Council (1988) recommended that science credit should be granted for certain agriculture courses. According to the Council:

> Special applied science courses on agricultural topics should be available as optional elective science courses for those students who wish to go beyond the traditional science course curriculum. Such courses, when designed and taught with an acceptable level of scientifically relevant content, should earn full academic credit toward high school graduation and college entrance. (p. 15)

In a nationwide study of secondary agriculture teachers, Dormody (1993) found that approximately 34% of the respondents were teaching agriculture for science credit. Of those teaching agriculture for science credit, approximately 66% held a valid science teaching certificate.

Science credit for agriculture would constitute a dramatic change in current practice for Arkansas agricultural educators. According to Norris and Briers (1989, p. 42), "Teacher's perceptions toward the change process (need for the change, manner in which the change was managed, and amount of teacher input into the change process, etc.) was the single best predictor of the teacher's ... decision concerning adoption of the change."

Other researchers have noted that teacher readiness for change is one of the most important variables associated with the success of school change in terms of student outcomes (Goodlad, 1975; Owens, 1987). Therefore, the current study was conducted to both gather information needed by the planning committee, and to serve as a mechanism for Arkansas agriculture teachers to have input into the change process.

PURPOSE AND OBJECTIVES

The purpose of this study was to determine the perceptions of Arkansas secondary agriculture teachers concerning science credit for agriculture. Specific objectives were to determine:

1. the level of support for granting science credit for agriculture, as perceived by agriculture teachers;
2. agriculture teachers' perceptions of the effects of offering science credit for agriculture;
3. agriculture teachers' level of support for five methods of granting science credit for agriculture;
4. agriculture teachers' level of support for four methods of certifying teachers to offer agriculture for science credit;
5. the extent to which agriculture teachers provided instruction related to objectives listed in the Arkansas Science Curriculum Framework (Arkansas Department of Education, 1993); and
6. the number of undergraduate semester credit hours completed and grades earned in science and mathematics courses, as reported by agriculture teachers.

METHODS AND PROCEDURES

The population for this study was composed of all Arkansas agriculture teachers employed in state reimbursed agricultural education programs during the fall 1994 semester (N=259). Personnel in the agricultural education section of the Arkansas Department of Education provided the researcher with a current database containing the name and school address of each teacher. The entire population of teachers was surveyed.

This study employed the descriptive research design using a mailed survey instrument. The 12-page instrument contained 81 type items designed to collect information in seven areas: (a) teacher, school and community support for offering science credit for agriculture (six items); (b) perceived effects of offering science credit (20 items); (c) preferred methods for offering science credit (six items); (d) preferred teacher certification methods (five items); (e) science content currently taught (26 items); (f) college science and mathematics course work and grades (10 items); and (g) teacher / program characteristics (eight items). Additionally, the back cover of the instrument contained both space and an invitation for written comments concerning science credit for agriculture.

The draft survey instrument was developed by the researcher based on input from the AVATA *ad hoc* committee on science credit for agriculture. The draft survey instrument was administered to 11 senior agricultural education students enrolled in the professional (student-teaching) semester to determine if the instructions, items, and response modes were clear. Based on individual written input and group discussion of instructions and items, minor wording changes were made.

Next, the revised instrument was reviewed for face and content validity, as well as clarity, by a committee of state agricultural education staff members attending a fall planning meeting. The committee was composed of the AVATA president, three district supervisors and the state supervisor of agricultural education, one post-secondary agriculture instructor, and seven teacher educators from three universities. The committee judged the instrument to be valid and no changes were suggested.

Finally, the instrument and a draft cover letter were mailed to the six teachers on the AVATA *ad hoc* committee on science credit for agriculture. The teachers were instructed to critically examine the survey instrument (and cover letter) for face and content validity and clarity using specified criteria. One week after the instruments were mailed, the researcher telephoned the committee members to get their input. The committee members responded positively to each of the six specified evaluation criteria. Based on these two reviews (by the state staff and the teacher committee), the instrument was judged to possess face and content validity, as well as clarity.

In order to establish test-retest reliability, a pilot test was conducted with seven upper division pre-service agricultural education teachers enrolled in a methods of teaching agriculture course. The students completed the instrument twice (at 14 day intervals). Based on procedures outlined by Ferguson (1976), Spearman rank-order rho correlations were calculated for each item and standardized by converting them to Fisher's Z scores. Then a mean Fisher's Z score was computed for the items within each of six instrument parts (reliability was not calculated for the teacher / program characteristics section).

The reliability estimates (coefficients of stability) were as follow: (a) teacher, school and community support for offering science credit for agriculture ($r = .67$); (b) perceived effects of offering science credit ($r = .92$); (c) preferred methods for offering science credit ($r = .83$); (d) preferred teacher certification methods ($r = .83$); (e) science content currently taught ($r = .70$); and (f) college science and mathematics course work and grades ($r = .96$).

Test-retest reliability was also estimated for the main study using a random sample of 10 respondents. The 10 respondents were contacted by telephone, and using the mailed survey instrument as an interview guide, responses to 26 selected items were obtained. The overall coefficient of stability for the instrument was .72. The period between completion of the mailed survey and the telephone interview varied from 3 to 12 weeks.

Data were collected during October-December 1994 following the Dillman (1978) procedure for mail questionnaire administration. An 82% (213 of 259) response rate was obtained after three mailings. To determine if non-response bias was a threat to the study, a random sample of six (13%) non-respondents was contacted by telephone and data were obtained on 32 (39.5%) survey items. A comparison of respondents to non-respondents did not indicate any significant differences between the two groups. Therefore, the researcher determined that the results were generalizable to the population.

RESULTS

The average teacher-respondent was 39.1 years of age ($SD = 9.4$), had taught agriculture for 14.2 years ($SD = 9.0$), and worked in a single-teacher department (74.5%). The mean student enrollment per teacher was 84.4 students ($SD = 30.8$).

Over one-half (56.1%) of the respondents reported the bachelors degree as the highest degree earned; 42.9% reported earning the masters degree; and 0.9% held the associates degree. Approximately one in every four (26.9%) respondents reported they currently held a valid certificate to teach science in Arkansas. Of those certified to teach science, 57.6% indicated having taught science in an Arkansas public school.

Objective One -- Support for Science Credit

As a group, the teachers were strong in their support for granting science credit for agriculture. In response to the statement, "I believe students should receive science credit toward high school graduation for agriculture courses," 88.8% agreed, 6.1% were undecided, and 5.1% were opposed.

The teachers also felt that agriculture should be recognized as a science for admission to post-secondary institutions. In response to the statement, "I believe Arkansas colleges and universities should accept agriculture courses as a science credit toward meeting admission requirements," 85.3% agreed, 9.5% were undecided, and 5.2% were opposed.

A majority of the teachers believed that selected educators and parents in their school districts would support granting science credit for agriculture. As shown in Table 1, perceived support was highest for parents and lowest for science teachers.

Table 1.
Support for Granting Science Credit for Agriculture, as Perceived by Agriculture Teachers

Statement	Disagree %	Neutral %	Agree %
Parents in my school district would support granting science credit toward high school graduation for agriculture courses. (n=210)	2.4	12.9	84.7
My building administrator (principal or vocational director) would support granting science credit toward high school graduation for agriculture courses. (n=208)	6.3	17.8	76.0
The guidance counselor(s) in my school would support granting science credit toward high school graduation for agriculture courses. (n=208)	5.3	19.7	75.0
The science teacher(s) in my school would support granting science credit toward high school graduation for agriculture courses. (n=209)	10.5	25.4	64.5

Objective Two -- Effects of Offering Science Credit

As a group, teachers indicated that offering science credit for agriculture would have positive effects on their programs. As shown in Table 2, over 80% of the teachers agreed that offering science credit for agriculture would: (a) improve students' attitude toward agriculture as a career, (b) increase enrollment in agriculture, (c) benefit students, (d) enhance the image of the agriculture program, and (e) cause the agriculture and science teachers to work together more closely.

Table 2.
Effects of Offering Science Credit for Agriculture, as Perceived by Agriculture Teachers

Statement	Response Disagree %	 Neutral %	 Agree %
Offering science credit for agriculture will:			
Improve students' attitudes toward agriculture as a possible career. (n=212)	5.2	15.6	91.5
Increase enrollment in my agriculture program. (n=212)	3.8	9.9	86.3
Benefit students in my school. (n=212)	3.3	10.8	85.9
Enhance my agriculture program's image. (n=212)	5.7	11.8	84.7
Cause me to work more closely with the science teacher(s) in my school. (n=212)	4.2	15.6	80.2
Increase the importance of my agriculture program within the school. (n-213)	9.4	12.2	78.4
Increase student interest in agriculture. (n=212)	2.8	19.3	77.8
Make science more meaningful for students in my school. (n=212)	6.1	19.3	74.5
Increase student interest in science. (n=213)	7.0	29.1	63.9
Cause more average-ability students to enroll in my agriculture courses. (n=212)	4.2	32.1	63.7
Require me to increase the science content in my agriculture courses. (n=212)	22.6	16.0	61.3
Cause more high-ability students to enroll in my agriculture courses. (n=213)	19.7	22.1	58.2
Result in higher student achievement in science. (n=212)	8.5	36.8	54.8
Cause more low-ability students to enroll in my agriculture courses. (n=212)	23.1	26.9	50.0
Cause me to teach fewer practical skills in my agriculture courses. (n=212)	53.3	18.9	27.9
Cause my agriculture courses to be thought of as "watered-down" science courses. (n=212)	51.4	21.2	27.3
Prevent me from teaching my students important vocational skills. (n=212)	60.4	21.7	18.0
Make me feel like a "second-rate" science teacher. (n=212)	72.2	17.9	9.9
Weaken my FFA chapter. (n=212)	75.5	17.0	7.5

As indicated previously, a large percentage (86.3%) of teachers agreed that offering science credit for agriculture would increase their student enrollments. As shown in Table 2, 63.7% of the teachers agreed that offering science credit would increase the enrollment of average-ability students, 58.2% agreed that high-ability student enrollments would increase, and 50% agreed that the enrollment of low-ability students would increase.

The data in Table 2 also indicate that a sizeable minority of teachers have concerns about the effects of offering science credit for agriculture. For example, 27.9% of the teachers agreed that offering science credit would cause them to teach fewer practical skills in their classes, while 27.3% agreed that their agriculture courses would be thought of as "watered-down" science courses.

Objective Three -- Support for Methods of Granting Science Credit

To satisfy this objective, teachers first rated their level of support for each of five methods of granting science credit for agriculture. As shown in Table 3, three of the methods were supported by 60% or more of the respondents. These three methods involved restricting science credit to a specified group of currently existing, modified, or new courses. Less than one-third of the teachers supported granting science credit for all agriculture courses, either with or without changes to enhance the science content of the courses.

Table 3.
Teachers' Level of Support for Methods of Granting Science Credit for Agriculture

Method	Oppose %	Neutral %	Support %
Award science credit for any one of a specified group of agriculture courses, with changes made to enhance the science content of the courses. (n=212)	16.0	18.4	65.6
Award science credit for any one of several new agriculture courses, specifically designed to teach science applications in agriculture. (n=212)	16.0	20.3	63.7
Award science credit for any one of a specified group of agriculture courses, with no changes in course content. (n=211)	19.9	18.5	61.6
Award science credit for all agriculture courses, with changes made to enhance the science content of the courses. (n=211)	53.6	15.2	31.2
Award science credit for all agriculture courses, with no changes in course content. (n=211)	64.0	15.2	20.9

Next, teachers selected their one most preferred method of granting science credit for agriculture from the list of five options. The two most favored methods both involved specifying a group of currently existing courses to receive science credit, either with (34%) or without (32%) changes made to enhance the science content of the courses. A sizeable percentage (23.9%) of the teachers preferred granting science credit for new agriculture courses specifically developed to emphasize science applications in agriculture. Small percentages of teachers preferred granting science credit for all agriculture courses, either with (4.6%) or without (5.6%) changes made to enhance the science content of the courses.

Objective Four -- Support for Methods of Certifying Teachers

For this objective, teachers first rated their level of support for each of four methods of certifying teachers to teach agriculture for science credit. The largest percentage of teachers (71.5%) supported granting an endorsement in agricultural science to all teachers currently holding a valid agriculture teaching certificate. Granting an agricultural science endorsement to only those teachers holding valid certificates in both agriculture and science was supported by the smallest percentage (17.9%) of teachers. Table 4 shows the response percentages for each of the four certification methods.

Table 4.
Teachers' Level of Support for Methods of Certifying Agriculture Teachers to Offer Science Credit for Agriculture.

Method	Oppose %	Neutral %	Support %
Grant an endorsement in agricultural science to all teachers currently holding a valid agriculture certificate. (n=212)	13.8	14.7	71.5
Grant an endorsement in agricultural science to only teachers holding a valid agriculture certificate, and completing a special agricultural science education in-service workshop. (n=212)	24.1	19.3	56.6
Grant an endorsement in agricultural science to only teachers holding a valid agriculture certificate, and scoring above a designated level on an agricultural science achievement test. (n=212)	54.0	25.1	20.8
Grant an endorsement in agricultural science to only teachers holding valid certificates in both agriculture and science. (n=212)	64.6	17.5	17.9

Next, respondents selected their one most preferred method of certifying teachers to teach agriculture for science credit from the list of four options. Granting an agricultural science endorsement to all teachers currently holding a valid agriculture certificate was the most favored method of 43.3% of the respondents. A sizeable percentage (37.8%) of teachers most favored granting an agricultural science endorsement to only those certified agriculture teachers completing an agriscience in-service education workshop. Endorsing only teachers certified in both agriculture and science was the method most preferred by 11.9% of respondents. Finally, 7.0% of respondents most preferred granting an agricultural science endorsement to only those certified agriculture teachers scoring above a designated level on an agricultural science achievement test.

Objective Five -- Science Content Currently Taught

The Arkansas Science Curriculum Framework (Arkansas Department of Education, 1993) contains 50 learner outcomes (objectives) for secondary school science. These objectives are divided into five strands (content areas): (a) scientific inquiry, eight objectives; (b) connections and applications, six objectives; (c) physical systems, 17 objectives; (d) life systems, nine objectives; and (e) earth and space systems, 10 objectives.

To assess the degree to which agriculture teachers were currently teaching content related to the state secondary school science objectives, a random sample (proportionally stratified by strand) of 26 objectives (52%) was listed in the survey instrument. For each objective, respondents were instructed to circle "yes" if the objective described content that they currently taught in one or more agriculture courses; respondents were instructed to circle "no" if the objective described content they did not currently teach in any agriculture course.

The respondents taught the highest percentage of objectives in the connections and applications strand, which emphasizes the relationship between science and its common applications. Respondents taught the lowest percentage of objectives in the physical science strand, which emphasizes chemistry and physics. Overall, the teachers reported providing instruction related to slightly over one-half of the 26 objectives investigated. Table 5 summarizes data concerning the science objectives currently taught, as reported by the respondents.

Table 5.
Science Objectives Currently Taught, as Reported by Agriculture Teachers.

Strand (Example objective)	Number of Objectives Sampled	Objectives Taught X	SD	%
Connections & Applications (n=206) (Assess the connection between pure science and the world of work.)	3	2.66	.73	88.7
Life Systems (n=201) (Understand that DNA is the basis for genetic transfer.)	5	3.79	1.26	75.8
Scientific Inquiry (n=208) (Perform error analysis on collected data.)	4	2.18	1.20	54.5
Earth/Space Systems (n=202) (Explain how earth materials are conserved and recycled.)	5	2.29	1.33	45.8
Physical Science (n=199) (Understand the rationale of the periodic chart.)	9	3.53	2.65	39.2
Total (n=188)	26	14.32	5.57	55.1

Objective Six -- Credit Hours and Grades in College-Level Science and Mathematics

The final objective of the study was to determine the number of credit hours and average grades earned by the respondents in college-level science and mathematics. The respondents reported earning the most semester credit hours in biology followed by chemistry. Teachers reported earning the least number of credit hours in physics; fewer than 20% of the teachers had taken any course-work in this area. Teachers reported earning the highest average grades in earth sciences (including soils), while earning the lowest average grades in chemistry. Table 6 summarizes data related to the credit hours and grades earned in science and mathematics, as reported by the teachers.

Table 6.
College Science and Mathematics Credit Hours and GPAs, as Reported by Agriculture Teachers.

	Semester Credit Hours				GPA Earned*			
Area	n	$\overline{X}$	SD	Med.	n	$\overline{X}$	SD	Med.
Biology	204	11.58	6.29	10.0	204	2.74	0.66	3.0
Chemistry	210	10.00	3.39	10.0	206	2.43	0.74	2.0
Earth Sciences	209	6.55	4.29	6.0	202	3.04	0.65	3.0
Mathematics	207	4.91	2.83	3.0	203	2.58	0.74	3.0
Physics	197	0.76	1.79	0.0	36	2.78	0.76	3.0

*Note. Based on A=4, B=3, C=2, D=1, and F=0.

RECOMMENDATIONS

The following recommendations are based on the results of this study:

1. Because of the perceived level of support by selected educators and parents, any initiative to secure science credit for agriculture should be planned and conducted as a cooperative effort involving these individuals.

2. Agriculture courses offered for science credit must contain relevant , rigorous science content that is taught in an applied context. Such courses would help alleviate concerns that science credit for agriculture will decrease the teaching of practical skills or result in agriculture being perceived as "watered-down" science.

3. Science credit should only be sought for a specified group of agriculture courses. A committee of agricultural and science educators should examine the content of currently existing courses to determine if they qualify for science credit, either with or without modification. Consideration should also be given to implementing new courses specifically designed to teach science in agriculture. Knowing that a

majority of agriculture teachers support each of these three methods should allow decision makers to select the most educationally sound option(s).

4. Majority support exists for granting certified agriculture teachers an endorsement to teach agriculture for science credit either through blanket certification (certify all teachers holding valid agriculture certificates) or through successful completion of an agriscience education inservice workshop. Even though the blanket endorsement is most popular with teachers, the researcher recommends that certification be earned through successful workshop completion.

5. As a group, the teachers reported that they taught material related to over one-half of the Arkansas science curriculum objectives studied. Further research should be conducted to determine the depth and rigor of the instruction provided.

6. Initial efforts to identify agriculture courses for science credit should focus on those related to the life sciences (e.g. plant- and animal-related courses). This recommendation is based on both the distribution of science objectives currently taught by the respondents and on their college science coursework.

7. Inservice workshops should be conducted to assist teachers in infusing science (especially physics) into agricultural mechanics courses, regardless of whether science credit is sought for such courses. This recommendation is based on the teachers' lack of coursework in physics and on the low percentage of physical science objectives taught by the respondents.

8. On average, Arkansas agriculture teachers reported having earned the credit hours and grades necessary to qualify for science certification (biological and general science endorsement). Eligible teachers should be encouraged to complete the NTE science specialty exam and become science certified, especially if they desire to teach agriculture for science courses.

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An Analysis of the Agriscience Laboratory Safety Practices of Louisiana Vocational Agriculture Teachers

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Introduction

Students in agricultural mechanics learn in an environment fraught with potential hazards. The very nature of the curriculum requires relatively inexperienced students to interact with tools, equipment, supplies, and situations which are potentially hazardous to their health and which could cause injury or death (Johnson and Fletcher, 1990).

Learning about safety must be an instructional priority for the teacher. Learning activities and work quality take second place to the physical safety of the students and teachers in the laboratory. It is imperative that teachers provide a safe and healthy learning environment for students (Pedham, 1990). Sullivan (1990) stated this safety attitude is accomplished by teachers wearing appropriate safety apparel, maintaining equipment properly, and modeling the usage of equipment safely. The responsibility of any teacher in an agricultural setting is to ensure the physical welfare and safety of students (Daniel, 1980; and Storm, 1979).

In 1980, Reynolds indicated students must develop knowledge and skills with more than machine operation. Students need to develop a safe attitude which guides them as they work in the agricultural laboratory. Reynolds (1980) further stated that accidents do occur and their causes can be identified. The majority of accidents are caused by unsafe actions of individuals (Jacob and Turner, 1981).

Recognizing the inherent dangers associated with Agriculture Mechanics Laboratories, teachers and educators past and present (Cook, Walker, and Snowden, 1952; Bear and Hoerner, 1986; Hoerner and Bekkum, 1990) have stressed the importance of safety.

Several safety studies have documented unsafe conditions which existed in the Agricultural Mechanics Laboratories in our nation (Brown, 1977; Lamb, 1984; Rudolph & Dillion, 1984; Gliem & Hard, 1988; Burke, 1989; Johnson & Fletcher, 1990; Hoerner & Bekkum, 1990; Bruening, Hoover, & Baugher, Seocombe, 1990; Bruening, Hoover, and Radukrishua, 1991; and Swan, 1993). It was noted that safety practices were deficient in many areas.

In 1983, Kigin summarized the status of safety in Vocational education laboratories when he stated: We stand in awe of the progress that has been made in industry to make the manufacturing process safe for workers and then with chagrin realize that not enough has been done in the schools. Violations of safe work practices are still quite evident, with hazards being ignored and emergency equipment inadequate (p.81).

According to Storm (1979), the National Safety Council estimated that 95% of all work related accidents could be avoided if proper safety precautions were employed. Since a safety analysis of Louisiana Agriscience Mechanics Laboratories had not been done, The Louisiana Vocational Agriscience Teachers Association conducted this safety study to determine program demographics and examine the safety practices currently used in the Agriscience Mechanics Laboratories of the state.

Purpose

Based upon teachers' and students' needs to be safe in a work environment and a review of related literature, the researchers determined a need to examine the safety conditions and safety instructional practices of Louisiana Agriscience Mechanics Laboratory Teachers.

This study was conducted to provide baseline data from which recommendations for safety programs improvements, and in-service offerings could be made. Specific objectives of the study were as follows:

1) To determine selected demographic information;
2) To determine the degree to which selected Agriscience laboratory safety practices were used by Louisiana Secondary Agriscience laboratories;
3) To determine the availability of selected safety and emergency equipment items in Louisiana Secondary Agriscience laboratories;
4) To determine the instructional methods and materials used by Louisiana Secondary Agriscience Teachers to teach Agriscience safety;
5) To determine the size and age of the Agriscience laboratories used by Louisiana Secondary Agriscience Teachers; and
6) To determine teachers' perception as to how safety instruction should be taught to Agriscience teachers.

Procedures

The study population was composed of all Louisiana Agriscience Teachers named in the 1992-93 LVATA Pictorial Directory. The survey instrument was administered at the Louisiana Vocational Agriculture Teachers' Associations summer in-service. Instruments were completed and turned in during the conference. Others were mailed to the researchers. The original instrument developed by Hoerner and Kesler (1989) was modified to fit the researchers' study needs in the Louisiana Agriscience laboratories. A letter was sent to Dr. T.A. Hoerner asking permission to use his safety instrument.

Dr. Hoerner telephoned and gave permission to use his instrument. Other versions of the instrument had been used successfully in Kansas, Ohio, Illinois, and other states.(T. A. Hoerner, Personal Communications May 1993).

After modification, the survey instrument was sent to a panel of experts for review. The panel consisted of the Agricultural Education and Experimental Statistics facility at Mississippi State University. Suggested changes from the expert panel were made. The instrument was judged to be valid. The descriptive research design was used to meet the research objectives.

The SPSS/PC (Norusis, 1986) statistical software package was used for data analysis. Descriptive statistics (means, frequencies, and percentages) were used to meet the research objectives.

Overall instrument reliability was not established since most items requested factual responses.

The revised instrument consisted of two parts. Part one solicited specific demographic information. Part two solicited responses to questions concerning safety practices, equipment, number of accidents, age and size of laboratory, instructional methods, and materials.

Results

Of the 227, one hundred fifty-four useable responses were received for a 67.8 percent response rate. Comparison of early and late respondents on selected demographic variables indicated that no significant differences existed. The results were generalizable to the population (Miller and Smith, 1983).

The average respondent was male, (96.7%), had 14.9 years of teaching experience with a range from one to forty-three years. On the average, these respondents had nineteen undergraduate agricultural mechanics credit hours and 2.6 graduate agricultural mechanics credit hours. Ninety-one percent (141 respondents of 154) indicated that they had some type of liability insurance coverage. Of the 154 respondents, 64.9% were not certified in first aid. Ninety respondents (60.8%) indicated that they would use first aid if necessary.

The typical agriscience mechanics laboratory area was fewer than 2,000 square feet (55.8%) and over twenty-five years old (36.6%). The average enrollment was 19.3 students per agriscience mechanics class with a range from six to thirty. The average number of secondary agriscience students per department was 108.8.

Of the teachers responding, 76 (76.4%) reported they received ten hours or fewer in agricultural mechanics safety instruction while in college. Ninety-two of the teachers (62.6%) indicated that they taught agricultural mechanics safety ten hours or fewer. While thirty-one teachers indicated that safety was not taught as a separate unit or integrated into their daily program. Eighty-nine teachers (61%) indicated that they were somewhat to poorly prepared to deliver safety instruction.

The average number of minor accidents during the 1992-93 school year was 3.6 with a range of zero to twenty. Fifty percent of the respondents indicated that they had two or fewer minor accidents.

The average number of major accidents was .27 with a range zero to five. One hundred and sixteen of the respondents indicated that they had no accidents. Twenty-four (16.4%) respondents indicated that they had one accident each. Approximately 49% of the respondents (72 of 154) indicated written accident reports were not kept on file. While 20.7% of the respondents (3 of 154) did not have a first aid kit in shop.

The most commonly reported (87.7%) safety practice employed by Louisiana Agriscience Teachers was requiring students to successfully pass safety exams, while the least reported was the provision of a non-skid floor around power tools. Only three of the thirteen selected safety practices were used by 75% of the respondents (See table 1).

Objective 3. Welding gloves (91.2%) were the most frequently reported safety equipment item available in the respondents' agriscience laboratories. Fire extinguishers were reported by 89.9%, followed by eye protection being reported by 84.4% of the respondents. Only four of the nineteen selected safety and emergency equipment items were available in more than 75% of the agriscience mechanics laboratories (See table 2).

Objective 4. Teacher demonstrating power tools (94.6%) was the most often used method in teaching agriscience lab safety. Teacher demonstrating hand tools (92.5%) was rated number two.

Safety instructional methods and materials used by Louisiana agriscience teachers are shown in table three. Books and manuals (88.5%) were the most often used material. Microcomputer programs (18.9%) and 16 millimeter films (12.8%) were the least used material.

Objective 6. Approximately 82% of the teachers indicated that they perceived the best way to teach safety to agriscience teachers was by the workshop method. Approximately eighty-one percent of the teachers perceived that safety should be taught in undergraduate agricultural mechanics classes. Approximately 44% of the teachers perceived the least effective way to teach safety to agriscience teachers was by the graduate course.

Conclusion and Discussion

Louisiana agriscience teachers are not using recommended safety practices or providing student safety and emergency equipment to the extent warranted by the hazards found in the agriscience mechanics laboratories. The findings of this study are consistent with similar studies in Missouri (Lamb,1984); Nebraska (Rudolph and Dillion, 1984); Ohio (Gliem and Hard, 1988); Iowa (Hoerner and Bekkum, 1989); Mississippi (Johnson and Fletcher, 1990); Pennsylvania (Bruening, Hoover, and Radhakrishna, 1991); and North Dakota (Swan 1993).

The most commonly used method of teaching safety was the teacher demonstrating the safe use of power and hand tools. Books and manuals were the most often safety material followed by videotapes. Most teachers required students to pass safety exams.

The most frequently available safety and emergency equipment was welding gloves, fire extinguishers, eye protection, first aid kits, welding exhaust systems, and fire alarms. This finding is consistent with the findings of Hoerner and Bekkum (1990) and Johnson and Fletcher (1990). Approximately forty-nine percent (72 of 154) indicated they did not file or did not have written accident reports.

Based on the results of this study, it is apparent that the Louisiana agriscience laboratories have unsafe conditions. Safety improvement must become a top priority of Louisiana agriscience educators.

The following recommendations were made based on the results of this study:

1) Louisiana agriscience teachers should be more stringent in the accident reporting procedure;

2) Teacher education programs in Louisiana should increase the amount of time spent on agriscience mechanics laboratory safety;

3) Agriscience teachers should model a positive attitude toward agriscience mechanics laboratory safety, providing a safe laboratory setting in which students can work and can learn;

4) Agriscience Mechanics Laboratory teachers should be provided in-service training on safety;

5) State supervisory personnel should emphasize safety when doing their local program visitation; and

6) Local and state funds should be earmarked for safety spending to improve safety and to improve emergency equipment availablity.

Table 1

Agriscience Lab Safety Practices Used By Louisiana Secondary Agriscience Teachers

	Response			
	Use Practice		Do Not Use	
Safety Practices	N	%	N	%
Student required to pass safety exams	123	83.7	24	16.3
Laboratory clean-up schedule	119	81.0	28	19.0
Written accident report forms completed and filed	110	75.3	35	24.0
Exits clearly marked	108	74.5	37	25.5
Student safety exams kept on file	97	66.0	50	34.0
Safety zones around power tools	91	62.8	54	37.8
Safety guards on all equipment	78	53.4	68	46.6
Safety rules posters near power tools	75	51.7	70	48.3
Scheduled safety inspections conducted	68	46.3	79	53.7
Student clean-up foreman designated	60	40.8	87	59.2
Power tools are safety color coded	59	40.7	86	59.3
Student safety engineer designated	31	21.1	116	78.9
Non-skid floor around power tools	6	4.1	139	95.9

Table 2.

Safety and Emergency Equipment Items in Louisiana Secondary Agriscience Laboratories.

	Response			
	Available		Not Available	
Equipment	N	%	N	%
Fire Extinguishers	134	89	16	11.0
Fire Alarms In Lab	130	67.6	47	32.4
First Aid Kit	124	79.3	30	20.7
Welding Exhaust System	115	74.7	37	25.3
Welding Boothes with Screens and Curtains	109	54.1	67	45.9
Vehicle Safety Standard	98	22.1	113	77.9
Safety Cans for Flammable Liquids	98	35.9	93	64.1
Dustmasks	94	29.9	103	70.1
Respirators	79	10.2	132	89.8
Welding Aprons	52	63.9	53	36.1
Welding Gloves	51	91.2	13	8.8
Ear Muffs	44	6.1	138	93.9
Shop Coats/Coveralls	32	34.7	96	65.3
Ear Plugs	32	21.8	115	78.2
Fire Alarms	15	67.6	47	32.4
Hard Hats	14	4.8	140	95.2
Fire Blankets	9	9.7	131	90.3
Eye Protection	7	84.4	22	15.0
Bump Caps	2	1.4	145	98.6

Table 3

Instructional Methods and Materials used by Louisiana Secondary Agriscience Teachers To Teach Agriscience Lab Safety

	Response			
	Use		Do not use	
Teaching Method/Material	n	%	n	%
Method				
Teacher demo hand tools	136	92.5	11	7.5
Teacher demo power tools	139	94.6	8	5.4
Students study safety books/manuals	135	91.8	12	8.2
Student demo power tools	120	81.6	27	18.4
Student demo hand tools	118	80.3	29	19.7
Material				
Books/Manuals	131	88.5	17	11.5
Videotapes	130	87.8	18	12.2
Transparencies	102	68.9	46	31.1
Worksheets	93	62.8	55	37.2
MicroComputer Programs	28	18.9	120	81.1
16mm film	19	12.8	129	87.2

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EFFECTS OF SAFETY INSTRUCTION UPON SAFETY ATTITUDES AND KNOWLEDGE OF UNIVERSITY AGRICULTURAL ENGINEERING STUDENTS

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EFFECTS OF SAFETY INSTRUCTION UPON SAFETY ATTITUDES AND KNOWLEDGE OF UNIVERSITY AGRICULTURAL ENGINEERING STUDENTS

Agriculture is one of North Carolina's most dangerous industries. Agricultural occupations continue to result in a disproportionate share of injuries and illnesses among all occupations in the state. According to the North Carolina Department of Labor (1992), total injuries and illnesses in agriculture and related occupations occurred at the rate of 9.0 cases per 100 full-time-equivalent workers in 1990, compared to the statewide rate of 7.8 cases for all industries. Additionally, reports for 1992 from a North Carolina Department of Labor news release (1993) showed that of the 169 fatalities due to workplace injuries in the state 25 (14.8%) were related to work in agriculture.

To address the problem of injuries and illnesses in agricultural occupations, the North Carolina Agricultural Health Promotion System (AHPS) was funded by the National Institute for Occupational Safety and Health (NIOSH) and developed as a joint effort between the North Carolina Cooperative Extension Service (NCCES) at North Carolina State University and the East Carolina University School of Medicine. The purpose of the AHPS is to identify farm safety problems and to provide education that will help to identify and solve farm safety problems. The AHPS should also promote both awareness of the causes of the safety problems in agriculture and a healthy and safe working environment for farm workers and their families (McLymore, Garland, Roberson, Crickenberger, Suggs, Mustian, & Langley, 1990). Through a cooperative effort including teaching, research, and public service, the AHPS is obligated to educate current and future workers in agricultural health and safety. This includes university education of future agriculture teachers and extension agents who encourage both correct safety practices and positive safety attitudes in their clientele.

Agriculture's disproportionate share of accidents in North Carolina make safety a special concern for those involved in agricultural pursuits. Coe (1961, p.40), in a discussion of farm safety, said that "farmers, rather generally, lack safety supervision, training, and enforcement. Farm people must be reached through education". Agricultural educators, including secondary high school teachers and extension agents, are primarily responsible for delivering agricultural education in the local communities.

North Carolina State University's role as a land grant university enables the curriculum content of its agricultural courses to reflect the latest developments in research knowledge. Agricultural students need this information in order to effectively implement current technology. Eventually, those students who complete the courses, enter the world of agricultural work and must apply the technology learned and solve production problems. Correct safety practices and positive safety attitudes will help future agricultural teachers, extension agents, and agricultural workers to solve these problems safely.

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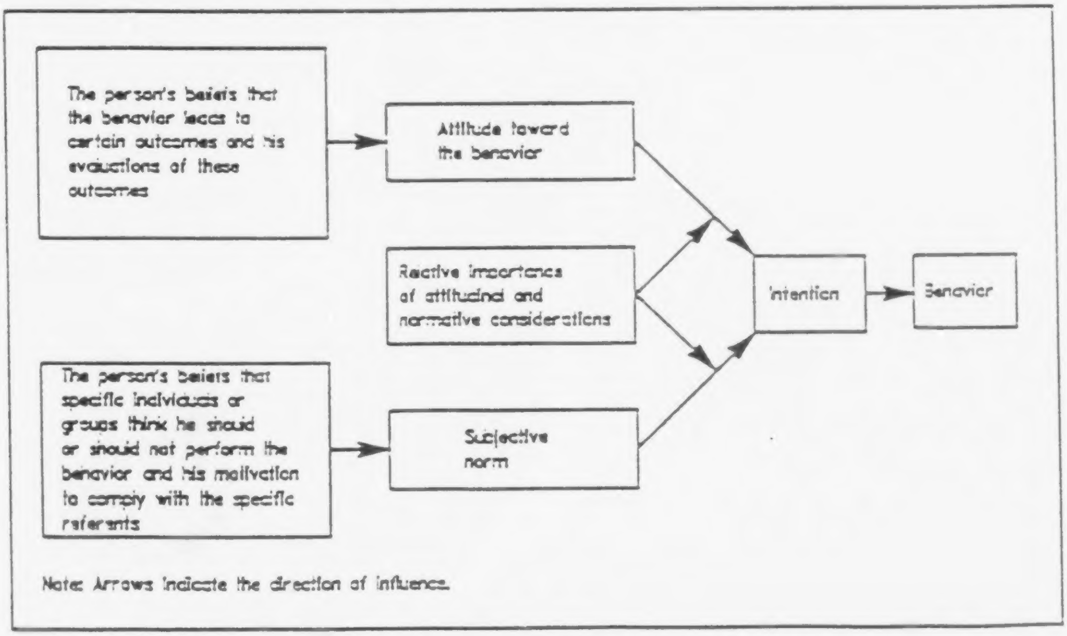
Correct safety practices are important for using this applied technology and are taught in most agricultural engineering courses. However, very little monitoring of the extent and effectiveness of the instruction has been done. There was a need to assess safety attitudes and knowledge of students in agricultural engineering courses so that future instruction could be designed. Baseline safety data needed to be established for the purpose of examining trends of those who participated in safety instruction and those who did not. Finally, it was important to determine if the AHPS safety program effected student safety attitudes and knowledge.

CONCEPTUAL FRAMEWORK AND LITERATURE REVIEW

Ajzen and Fishbein (1980) have described their theory of reasoned action to model how an individual processes the behavioral components to determine whether to perform a particular behavior. The best indicator of an individual's behavior is his or her intention for performing the behavior. This relationship will be significant if there is a high degree of correspondence between the behavior and the intention in terms of specific action, target, context, and time elements.

Intention to perform a behavior is determined by the relative importance of both attitude toward performing the behavior and the perceived importance to comply with other people toward performing the behavior. So, even though someone may have positive attitudes toward performing a behavior, the intention of performing the behavior may not materialize because of negative subjective norms. Again, there must be a high degree of correspondence between the intention and both the attitude and the subjective norm in the model as shown in Figure 1.


The person's beliefs that the behavior leads to certain outcomes and his evaluations of these outcomes
Attitude toward the behavior
Relative importance of attitudinal and normative considerations
Intention
Behavior
The person's beliefs that specific individuals or groups think he should or should not perform the behavior and his motivation to comply with the specific referents
Subjective norm

Note: Arrows indicate the direction of influence.

Figure 1. Theory of Reasoned Action. Ajzen, I & Fishbein, M. (1980). Understanding attitudes and predicting social behavior. p.8. NJ: Prentice Hall. Reprinted by permission.

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In the theory of reasoned action attitude is determined by the person's beliefs that performing the behavior will lead to either positive or negative outcomes and the person's evaluation of these outcomes. Subjective norm is determined by the person's perceived beliefs that other people have as to whether the behavior should be performed and the person's motivation to comply with these people.

Safety Attitudes

Murphy (1992) reviewed reasons why attitudes are important to safety. Attitudes are stable and difficult to change; they are learned from past experiences and social influences, and help to process new information; and they influence behavior in many situations. Attitudes also are used to evaluate new knowledge based upon general knowledge in a general category.

Safety attitudes could also be influenced by the actions and examples of people in authority. In the first portion of their study, ReVelle and Boulton (1981) found that safety attitudes of employees were motivated by their company's commitment to safety. They stated that "...management's influence on the worker is too important to be ignored, neglected, or treated casually. Even without proper care and feeding, management's attitudes will be transmitted to the employees, for good or for ill" (p. 34). Employees reported a favorable safety perception of their supervisors who made safety a continuing habit.

Predictors of Safety Attitudes

Correlations with safety-related antecedents can be used to study safety attitudes. Harper (1984) found that certain antecedents could help predict student safety attitudes. Development of his survey instrument included components that would assess students' safety attitudes, students' formative experiences, a student school process factor, a student home process factor, and a student work process factor. Final coefficient alphas ranged from .51 to .87 for nine total individual variables within the three process factors.

For 258 agricultural mechanics students at four levels of schooling (comprehensive high school, joint vocational school, two-year technical school, and four-year university), Harper found that there was a significant positive relationship between the students' safety attitude and the cumulative set of students' formative experiences. Harper also found that there were significant positive relationships between students' safety attitudes and both school and home process factors.

Of the student formative experiences Harper measured, three were found to have significant positive low relationships with student safety attitudes. These three were the students' perceptions of their own safety knowledge ($\underline{r}$ = .27), type of school ($\underline{r}$ = .22), and type of work experience ($\underline{r}$ = .15).

All individual variables within each of the three process factors were found to have significant positive relationships with the students' safety attitudes. The variables for the school process factor were students' perceptions of their teacher's safety attitude ($r = .42$), teacher's safety knowledge ($r = .49$), and school safety environment ($r = .35$); these were all moderate relationships. The variables for the home process factor were students' perceptions of their parent's safety knowledge ($r = .35$), parent's safety attitude ($r = .41$), and home safety environment ($r = .36$); these, too, were moderate relationships. The variables for the work process factor were students' perceptions of their employer's safety knowledge ($r = .16$), employer's safety attitude ($r = .17$), and work safety environment ($r = .23$); these relationships were low.

Harper then performed a stepwise multiple regression analysis and determined that (a) students' perceptions of their teacher's safety knowledge, (b) students' perceptions of their parents' safety attitude, (c) students' perceptions of their own safety knowledge, and (d) type of school explained a significant amount of the variance in students' safety attitudes. He determined that the multiple regression equation for this set of variables accounted for 36% of the variance in the students' safety attitude scores ($R^2 = .36$).

Aherin (1988) evaluated the theory of reasoned action for its application to selected farm safety problems. He found significant positive correlations between safety attitudes and behavioral intentions for each farm safety problem. The correlations ranged from .43 to .81 (moderate to very strong), and were significant at $p < .01$ In addition, he found significant positive relationships between all adjacent components of the theory of reasoned action, but that external variables such as age, educational level, sex, cow herd size, milk production, and average hours worked per week did not produce any measurable effects with the intention to perform any of the safety behaviors. Aherin concluded that the theory of reasoned action was a valid model to use when determining farm safety behaviors.

Safety Knowledge

Awareness of the importance of safety is an attitude that can be cultivated through the knowledge of both the correct safety practices and the consequences of failing to follow them. Strasser, Aaron, Bohn, and Eales (1964) stated:

> The development of safe attitudes is associated directly with the development of an awareness of the accident problem. After people become aware of the nature of the problem they often are willing to accept responsibility for correcting it. This willingness, coupled with proper information, can develop a readiness to react toward hazardous conditions in a safe manner. (p. 61)

Dombrowski (1983), discussing her results of a secondary school laboratory safety study, said that "there seems to be a need to encourage a positive attitude toward safety coupled with a sense of student responsibility" (p. 68). Out of 392 students, 333 received both the pretest and the posttest. Dombrowski found that there was a positive increase in laboratory safety knowledge following a five-period instructional unit on laboratory safety. The overall mean gain for the experimental group was 1.96 and the overall mean gain for the control group was -0.57, resulting in a difference between the two gains of 2.53. An analysis of covariance, which adjusted for differences in means of the pretest scores, resulted in an *F* value of 61.21 that was significant at the _ = .05 level.

The results of the correlated *t*-test at the _ = .05 level of significance showed that the difference between the pretest and posttest means for the experimental group was significant in a positive direction. The difference between the pretest and posttest means of the control group was also significant, but the direction was negative.

Dombrowski concluded that a laboratory safety unit was effective for both increasing students' laboratory safety knowledge and decreasing laboratory safety errors, and that awareness of safety procedures was related to safe laboratory performance. She also noted that had the safety procedures experiment been done in the first instead of the second semester, there may have been a more pronounced effect on the results of the study; this was because some safety instruction may have previously occurred in some of the courses and not in others.

PURPOSES

This study investigated the effects of agricultural machinery safety instruction upon both agricultural machinery safety attitudes and safety knowledge of students enrolled in selected agricultural engineering courses at North Carolina State University. Secondary purposes of the study were to investigate the role of process factor variables in predicting preexisting agricultural machinery safety attitude, and to investigate the relationships between agricultural machinery safety attitudes and school process factor variables following safety instruction.

More specifically, the study attempted to answer the following research questions:

1. To what extent do students' perceptions of the following process factor variables relate to preexisting student agricultural machinery safety attitudes? (a) instructor's safety attitude, (b) instructor's safety knowledge, (c) school laboratory safety environment, (d) parent's safety attitude, (e) parent's safety knowledge, (f) home safety environment, (g) employer's safety attitude, (h) employer's safety knowledge, and (i) work safety environment relate

2. What effect does safety instruction have on students' agricultural machinery safety attitudes?

3. What effect does safety instruction have on students' agricultural machinery safety knowledge?

4. What is the relationship between agricultural machinery safety attitudes and agricultural machinery safety knowledge following safety instruction?

5. To what extent do students' perceptions of the following school process variables relate to students' own agricultural machinery safety attitudes following safety instruction? (a) instructors' safety attitude, (b) instructors' safety knowledge and (c) school laboratory safety environment

METHODS AND PROCEDURES

The nonequivalent control group research design was used. The design employed both experimental and control groupings, using course and laboratory sections from two-year Agricultural Institute, four-year undergraduate 200 level, and four-year undergraduate 300 and 400 level courses. The treatments were randomly assigned within each category.

Population and Sample

The population consisted of all students enrolling in machinery-related agricultural engineering courses at North Carolina State University. A purposive sample, representing a sample in time, was composed of two-year Agricultural Institute and four-year undergraduate students enrolled in ten course and laboratory sections during the 1992 spring semester. A total of 127 students composed the data sample. Seven students were posttested only, since they had been absent during the pretesting. Some students in the experimental sections were absent for the safety instruction; their scores were treated as control group scores. The experimental sections included 64 students, 63 whom had been both pretested and posttested. The control sections included 63 students, 57 whom had been both pretested and posttested.

Instrument Development

Attitude Assessment

The safety attitude component of Harper's (1984) instrument was modified. Potential statements deemed to refer specifically to agricultural machinery safety attitudes were solicited from professors in the Department of Biological and Agricultural Engineering (BAE) at NCSU. These statements were phrased to elicit either agreement or disagreement on a Likert-type scale. A panel of experts from BAE and the graduate faculty reviewed the statements and validated 80 of the initial 95. Pilot testing resulted in the development of two alternate forms of the instrument. Internal consistencies (coefficient alpha) for Form A and Form B were .951 and .938 respectively. Student's t-test for paired data between Form A and Form B was not significant ($t = 2.08$, $df = 22$, $p > .05$) and the two forms were deemed equivalent for testing purposes.

Attitude Predictor Assessment

The attitude predictor component of the new instrument was modified for this study by revising Harper's (1984) statements so that the students could apply their responses toward their most recent instructors. An internal consistency reliability of .65 or better was acceptable for retaining the process factor variables. Eight of the nine met this criterion with six of the nine surpassing .85. The variables included the students' perception of: a) teachers' safety attitude, b) teachers' safety knowledge, c) parents' safety knowledge, d) parents' safety attitude, e) home safety environment, f) employers' safety knowledge, g) employers' safety attitude, h) work safety environment. The process factor variables were employed as attitude predictors.

Safety Knowledge Assessment

The true/false statements developed for safety knowledge component were derived from the actual safety instruction, and reflected the major concepts of the safety instruction. These statements were scored using the confidence-weighted scoring system described by Ebel (1965). After the elimination of nine statements, tests for internal consistency yielded a coefficient alpha of .784.

Instruments given in the study were pretests which included either Form A or B of the attitude measurement component and nine process factor variables. Posttests included either Form A or B of the attitude measurement component, the school process factor variables, and the knowledge assessment component.

Demographic Information

Information describing the students' agricultural employment experience, community place of residence, previous safety/accident history, and whether the student had been in other agricultural engineering classes and the safety environment of those classes. The statements were validate by the panel of experts. the items were not scaled, specific information was sought so reliability estimates were not appropriate..

Data Collection Procedures

The pretest instrument was administered to students in the ten course and laboratory sections during the inclusive period from March 30 to April 6, 1992. Both forms of the pretest were randomly distributed to the students in each section. Following the pretest, the safety instruction was presented to all students in the experimental sections.

The posttest instrument was administered two weeks following the pretesting and instruction in each section. Each student was given the opposite form of the posttest to reduce the memory effect of responding to the same statements on the attitude measurement instrument.

RESULTS

Relations with Pretest Safety Attitudes

Correlational analysis showed that of the nine process factor variables, only seven showed significant relationships with pretest safety attitudes (Table 1).

Table 1
Pretest Correlations Between Attitude and Process Factor Variables

Pretest process factor variables	Correlation with pretest attitude	
Students' perception of:	r	n
Instructor's safety attitude	.290*	120
Instructor's safety knowledge	.382*	120
School safety environment	.275*	120
Parent's safety attitude	.206*	120
Parent's safety knowledge	.120	120
Home safety environment	.190*	120
Employer's safety attitude	.309*	120
Employer's safety knowledge	.201*	120
Work safety environment	.161	120

*$p < .05$.

A stepwise multiple regression analysis was used to best predict preexisting student agricultural machinery safety attitudes. Of all pretest process factor variables included in the stepwise multiple regression analysis, only one remained as the best predictor of pretest safety attitudes. The best predictor of preexisting student safety attitudes was the students' perceptions of their instructor's safety knowledge; additional pretest process factor variables did not increase significantly the coefficient of determination. The coefficient of determination for this model regression was significant ($R^2 = .183$, $F = 23.68$, $df = 1$).

Safety Instruction Effect on Safety Attitudes

Using pretest attitude scores as covariates, an analysis of covariance was used to interpret posttest attitude differences between the groups. The result from this analysis indicated that there was no significant difference between the posttest attitude group means ($F = 0.32$, $df = 1$, $p > .05$).

Safety Instruction Effect on Safety Knowledge

Using an analysis of variance, the posttest knowledge means of the two groups were tested for differences. The result from this analysis indicated that there was a significant difference between the posttest knowledge means of the control and experimental groups ($F = 24.68$, $df = 1$, $p < .05$).

Relation Between Safety Attitudes and Knowledge

Posttest correlation of the scores from the experimental group showed that there was a positive moderate relationship between the safety attitude and knowledge scores ($r = .348$, $n = 64$, $p < .05$). The posttest correlation between safety attitude and knowledge scores for the control group, which did not receive the safety instruction, was not significant ($r = .154$, $n = 62$, $p > .05$).

Relations with Posttest Safety Attitudes

Correlational analysis showed that all three of the school process factor variables showed significant relationships with posttest safety attitudes. These variables, along with their correlation coefficients, are shown in Table 2.

Table 2
Posttest Correlations Between Attitudes and School Process Factor Variables

Posttest process factor variables	Correlation with posttest attitude	
Students' perception of:	r	n
Instructor's safety attitude	.362*	64
Instructor's safety knowledge	.386*	64
School safety environment	.352*	64

$p < .05$

CONCLUSIONS

Based upon the results of this study, the following conclusions were drawn for students in the courses selected to benefit from agricultural machinery safety instruction in the Department of Biological and Agricultural Engineering at NCSU:

1. The safety attitudes and safety knowledge of instructors, parents, and employers may influence the formation of the safety attitudes of students. There are positive relationships between students' agricultural machinery safety attitudes and factors from within the students' school, home, and work environments.

2. It is unlikely that safety instruction alone will result in a change of students' attitudes toward agricultural machinery safety. Following agricultural machinery safety instruction, increases in students' agricultural machinery safety attitudes are doubtful to be detected.

3. Safety instruction does result in students' awareness of agricultural machinery safety concepts. Following agricultural machinery safety instruction, increases in students' agricultural machinery safety knowledge can be detected.

4. Students with more positive agricultural machinery safety attitudes are likely to be more receptive and open to agricultural machinery safety instruction. Following agricultural machinery safety instruction, there is a significant relationship between students' agricultural machinery safety attitudes and knowledge.

5. The agricultural machinery safety attitudes and knowledge of instructors, along with the condition of agricultural machinery school laboratories, are possible influences upon students' attitudes toward agricultural safety. Following agricultural machinery safety instruction, there are significant associations between students' agricultural machinery safety attitudes and their perceptions of their (a) instructor's safety attitudes, (b) instructor's safety knowledge, and (c) school laboratory safety environment.

RECOMMENDATIONS

Based upon this study, several recommendations were made for implementation into actual practice:

1. Instructors of agricultural machinery and related courses at the university level need to be aware of their potential influence upon students' safety attitudes. The instructors should display both a positive safety attitude and a high proficiency of safety knowledge in all phases of course content delivery. Over periods of time, this will encourage students to possess more positive safety attitudes.

2. Agricultural machinery instructors need both to teach and to demonstrate safety concepts as an integral component of agricultural machinery courses. Safety practices should be taught and demonstrated throughout the term. This will result in both an increase of students' safety knowledge, and a probable improvement of their agricultural machinery safety proficiency.

3. Safety needs to be emphasized in agricultural machinery laboratories. A safe laboratory environment needs to be maintained, and instructors should insist on correct safety behaviors at all times. Over time, this will persuade students to learn and to demonstrate correct safety practices around agricultural machinery.

4. Instructors need to emphasize to students, as potential employers and parents, that their own (the students') safety attitudes will influence the safety of their own employees and children. This emphasis should be approached from the standpoints of both personal safety and safety for others. This will begin or enforce a tradition of safety responsibility for the students' own children and employees.

5. There needs to be an effort by university administration to enhance the safety environment of agricultural machinery laboratories. Administrators can ensure that this will be accomplished. This will promote an increased level of safety proficiency by instructors and their students.

Recommendations for Further Research

After completing this study, several suggestions were made for further educational research:

1. Other variables should be explored for their relationships with agricultural machinery safety attitudes. These variables include - but are not limited to - influences by school peers and fellow employees.

2. Safety attitudes should be surveyed both early and late in the school year to assess the contribution by instructors and school process factor variables.

3. Safety behaviors by students in agricultural machinery laboratories should be analyzed for their relationships with students' safety attitudes and safety knowledge.

4. Studies should be conducted to discern whether a more positive safety attitude is responsible for higher safety knowledge retention or if it results from some other influence.

5. Safety instruction should be evaluated for its relevancy in all university courses where hazards exist. These courses need to be identified and examined for the development of effective safety instructional methods.

6. To examine the generalizability of the effects of safety instruction, the effects of safety instruction should be assessed for both other populations and other levels of education. This includes - but is not limited to - other agricultural and nonagricultural disciplines where hazards exist.

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AIR QUALITY IN SECONDARY AGRICULTURAL MECHANICS LABORATORIES

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INTRODUCTION AND THEORETICAL FRAMEWORK

Students need a safe environment in which to learn. In the classroom it is relatively simple to provide such a situation. However, many educational topics are better learned when accompanied by appropriate laboratory experiences. Laboratory experiences provide application of skills and concepts which are important for many subjects. Laboratories may not be expected to be as clean as the classroom, however, they are expected to maintain cleanliness and safety to the point that education is enhanced. This would include safety from less obvious, as well as the readily apparent dangers.

Courses which include welding operations can pose such unobvious threats. Fumes and gases which are recognized as hazardous to human health are produced in both electric and gas welding operations. The immediate effects of exposure to welding particulates can include irritation of the skin, eyes and respiratory system. Exposure over an extended period of time can lead to chronic health problems (Jacobs and Miller, 1991).

Westrom and Lee (1989) found that agricultural science teachers are aware that agricultural mechanics laboratories can pose health threats to teachers, students, and visitors. They found that air quality ranked second (23%) among agricultural science teachers in a list of ten greatest environmental problems associated with agricultural mechanics laboratories.

All secondary agricultural mechanics laboratories are equipped or are required to be equipped with some type of ventilation system to minimize the health hazards to students, teachers and visitors in the area (Jacobs, 1979). Due to cost and ease of maintenance, exhaust fans appear to be the most common type of mechanical ventilation in secondary agricultural mechanics laboratories. According to Jacobs and Miller (1991), for most welding laboratories, exhaust system performance data are not included in the mechanical and educational specifications for facilities. This often leaves school administrators and teachers ignorant of the strength or weakness of the system in use at heir school.

Layman (1991) found that students and teachers in a welding laboratory at a particular University were exposed to levels of welding fume particulate which exceeded Occupational Safety and Health Administration (OSHA) time weighted averages (TWA), despite the use of a mechanical ventilation system. In that study, no other documentation was found to suggest that agricultural mechanics laboratories exceeded OSHA standards. However, this was attributed to previous studies emphasizing industrial user hazards versus secondary school settings. Industrial workers are exposed to welding hazards more often and for longer periods of time, whereas student exposure is typically shorter and less frequent. It was further stated that although their exposure is different than that of industrial workers, students still come into contact and can be affected by the hazards associated with welding operations.

Agricultural mechanics laboratories are included in the majority of agricultural science programs. It is then safe to assume that the potential for exposure to welding fume particulates exists for teachers and students utilizing these facilities.

PURPOSE AND OBJECTIVES

The major purpose of this study was to determine if the ventilation systems in high school agricultural science welding laboratories within a 40-mile radius provide adequate protection from welding fume exposure for students enrolled in agricultural mechanics courses according to standards set by OSHA.

As a means of accomplishing this purpose, the following objectives were formulated.

1. To determine the level of researcher exposure to iron oxide collected on a filter for a specified, timed welding session with the ventilation system turned "on".
2. To determine the level of researcher exposure to iron oxide collected on a filter for a specified, timed welding session with the ventilation system turned "off".
3. To determine the effect of individual ventilation systems on researcher exposure to iron oxide.
4. To determine if area agricultural mechanics laboratories expose users to iron oxide levels which exceed OSHA standards.
5. To determine the duration of continuous welding that can be performed before OSHA limits are reached.
6. To determine the type of ventilation systems being used in area high schools.
7. To examine possible relationships between ventilation system type and researcher exposure.

METHODS AND PROCEDURES

This study was a descriptive survey designed to collect data to determine if welding fume particulate exposure levels of agricultural mechanics laboratories in the surrounding area met OSHA and NIOSH standards. It was also intended to determine the difference in particulate levels between samples taken with the ventilation systems in operation versus samples taken with the ventilation systems not operating. An additional purpose was to determine what types of ventilation systems were in use at the area schools.

The population of this study consisted of agricultural mechanics laboratories in a 40-mile radius that had a functioning agricultural mechanics program. There were 29 programs meeting these criteria. Data from two to three agricultural mechanics laboratories were collected on Wednesdays and Fridays until all laboratories in the study were sampled. This study was limited to the ventilation systems within the aforementioned schools.

Welding fumes were produced by welding with an arc welding machine in the subject school using an E6011 mild steel electrode, 1/8 inch in diameter. Welding was performed on a 1/4 inch hot rolled, low carbon steel plate.

Particulates entering the welder's breathing zone were sampled by using a Mine Safety Appliance (MSA) Portable Personal Sampling Pump Model G to draw samples into a field monitor cassette containing a membrane filter that was 37 millimeters in diameter with a pore size of 0.8 microns. The researcher served as the welder for all samples taken.

When taking samples of the welder's breathing zone in the agricultural mechanics laboratories, arc-welding machines belonging to the subject school were utilized. Care was taken to select a welding machine which was neither the closest nor the furthest from the exhaust system. Rather a machine which seemed to be of average proximity to the ventilating system for the individual laboratory was chosen.

The teacher at the subject school was then asked to instruct the investigator as to how the ventilation system worked and if there were any additional practices normally engaged in during welding instruction at the school (e.g., opening the shop door or opening windows). No teacher or student participation occurred in the actual collection of the samples.

At each school, two 10-minute samples were to be taken. One with the exhaust system operating (sample A) and one without the ventilation system operating (sample B). Sample A was taken first at each site, followed by sample B. The ventilation system was allowed to run for at least 3 minutes after the first sample had been acquired. This allowed the air in the welding area to return to a condition close to that which preceded taking sample A.

The hot rolled steel padding plate and sufficient E6011, 1/8 inch diameter mild steel electrodes were placed on the selected welding table. The Mine Safety Appliance (MSA) Portable Personal Sampling Pump Model G used to collect the welding particulates was then calibrated according to the instrument's instructions. The pump was clipped to the investigators belt and a clear plastic hose connected the pump to the filter cassette. Cassettes were positioned in the welder's breathing zone.

The exhaust system was turned on, and when the investigator was in position to weld, the welder was turned on and adjusted to 110 amps or as close as possible with a particular welder. A stop watch with an audible alarm was then set for a ten minute time and started. The investigator unplugged the cassette, positioned his face shield and proceeded to weld until the alarm sounded.

When the alarm sounded, welding was stopped and the cassette was immediately plugged, taken off of the hose and plugged on the other side, given an identifying mark (e.g., 21A, meaning school #21, sample A) and set in the Mine Safety Appliance carrying case.

Additional information was then recorded on a specifically designed data sheet. Information taken included the type of ventilation system in use, location of the system in relation to the welder, and any additional comments or notations the investigator felt it was necessary to make.

A new cassette was then fastened to the MSA hose and the investigator's collar, the exhaust system turned off and the above process repeated through the placing of the new cassette in the MSA carrying case.

Some training was required for servicing and calibrating the MSA Portable Personal Sampling Pump. A pilot study was conducted using the agricultural mechanics welding laboratory at Texas Tech University prior to the field study. This allowed for sufficient practice and provided the opportunity to correct operating problems that occurred in learning to use the device.

The samples taken for this study were analyzed by American Analytical Laboratories, 3431 E. Melber Drive, Tucson, Arizona (85714). Results were reported in micrograms of iron oxide (Fe_2O_3) per filter paper (migr/fil).

These data were then converted into milligrams per cubic meter (Mg/M^3) using the calculation Mg/M^3 = (Micrograms per filter) * (0.001/0.024), which in turn was used to produce the time-weighted concentration (TWC) with the calculation TWC = Mg/M^3 * 48. Also from the Mg/M^3 figures, fifty-minute equivilents (50"EQ) were calculated using the formula 50"EQ = Mg/M^3 * 5.

The actual change in Mg/M3 was calculated by subtracting the non-ventilated sample (sample B) from the ventilated sample (sample A): Change in Mg/M^3 = (Mg/M3 A) - (Mg/M3 B).

Mean, median and standard deviation were also calculated. Microsoft Excel 4.0 spreadsheet program for the Macintosh was utilized for all calculations.

FINDINGS

The exposure levels generated during both the "on" and "off" conditions of ventilation system operation were used in calculations to produce the exposure levels presented in Table 1. The data in Table 1 addresses objectives 1 and 2. The samples collected with the ventilation systems “on” resulted in a high of 30.00 mg/m^3 and a low of 0.05 mg/m^3. The mean was 2.84 mg/m^3 with a standard deviation of 5.86 mg/m^3. The median was 0.77 mg/m^3. The samples collected with the ventilation systems “off” resulted in a high of 18.88 mg/m^3 and a low of 0.13 mg/m^3. The mean was 1.93 mg/m^3 with a standard deviation of 3.71 mg/m^3. The median was 0.91 mg/m^3.

Descriptive data were generated from the collected data to determine the effect that operation of the ventilation system had on exposure levels. This data is presented in Table 2 and addresses objective three. Operation of the ventilation system at each test site had either a positive or negative effect on the level of student exposure to iron oxide. System operation at seventeen schools increased the levels of iron oxide exposure, while twelve schools showed that iron oxide entered the breathing zone at lesser levels while the system was in operation. An 11.13 mg/m^3 increase in particulate was highest while a 1.43 mg/m3 decrease was the lowest change in particulate exposure. The mean change was 0.91, with a standard deviation of 3.23, and a median of 0.11. Percentage change in exposure to particulate matter resulted in a high of 899.66% increased exposure to a low of 82.89 % decreased exposure. The mean was 89.47 with a standard deviation of 220.97 and a median of 25.00.

Table 1. Milligrams Iron Oxide per Cubic Meter for Various Conditions of Ventilation System Operations.

School	Mg/M3 for System "ON"	Mg/M3 for System "OFF"
1	0.38	0.29
2	0.34	0.45
3	1.64	2.09
4	0.76	0.42
5	0.54	0.52
6	0.94	0.45
7	0.31	0.48
8	0.69	1.80
9	0.88	0.76
10	12.37	1.24
11	30.00	18.88
12	1.78	1.17
13	5.88	9.58
14	2.08	2.57
15	0.77	2.20
16	7.08	0.91
17	0.76	1.42
18	3.56	1.26
19	1.13	0.59
20	0.05	0.32
21	0.74	1.97
22	1.46	1.17
23	0.58	0.18
24	0.10	0.23
25	1.03	0.22
26	0.31	0.13
27	0.68	1.23
28	5.17	3.23
29	0.36	0.16
Mean	2.84	1.93
Standard Deviation	5.87	3.71
Median	0.77	0.91

Table 2. Change in Researcher Exposure to Iron Oxide.

School	Change	%Change
1	0.08	28.57
2	-0.11	-24.07
3	-0.45	-21.71
4	0.34	82.00
5	0.02	3.20
6	0.50	111.21
7	-0.17	-34.78
8	-1.11	-61.66
9	0.11	14.75
10	11.13	899.66
11	11.13	58.94
12	0.62	52.86
13	-3.71	-38.70
14	-0.48	-18.83
15	-1.43	-65.15
16	6.18	679.82
17	-0.65	-46.18
18	2.30	182.78
19	0.53	90.14
20	-0.26	-82.89
21	-1.23	-62.58
22	0.29	25.00
23	0.40	225.58
24	-0.13	-54.55
25	0.81	375.00
26	0.18	134.38
27	-0.55	-44.75
28	1.94	60.21
29	0.20	126.32
Mean	0.91	89.47
Standard Deviation	3.23	220.97
Median	0.11	25.00

Data were also calculated to compare area laboratories with OSHA standards. The results are presented in Table 3 and answer objective 4. The standard given by OSHA is 5 mg/m^3 in one 24-hour period. The ten-minute samples indicated five schools produced levels above OSHA guidelines, while 24 schools were below the governmental standards. The highest concentration was 25.00 mg/m3 above the 5 mg/m^3 standard, while the lowest concentration was 4.95 mg/m^3 below it. The mean, standard deviation, median, and mode for comparisons of ten-minute samples were -2.1, 5.87, -4.23, and -4.69 respectively. These data were then used to project 50 minute equivalent exposures. Twelve schools were above the limit and seventeen were below. The highest concentration collected was 145.00 mg/m^3 above governmental standards and the lowest was 4.73 mg/m^3 below. The mean, standard deviation, median and mode for the entire group were as follows: 9.20, 29.34, -1.17, -3.44. Upon calculating projections for eight-hour equivalents, one school was found to be in compliance, with -2.40; the remaining 28 schools were above the exposure level, with a high of 1435.00 mg/m3. The mean, standard deviation, and median for eight-hour projections were 131.32, 281.63, and 31.80, respectively.

Because secondary laboratory sessions would be most efficiently measured in minutes, the minutes of continuous welding before OSHA limits would be reached was calculated for each lab. This data is also presented in Table 3 and answers objective 5. A high of 923.08 minutes and a low of 1.67 minutes were calculated using the 10-minute sample data. The population mean was 106.78, with a standard deviation of 181.28, and a median of 65.22.

Written descriptions were made of the ventilation systems in use at the area agricultural mechanics laboratories in order to answer objective 6. Two laboratories had duct systems while five laboratories had canopy hood exhaust ventilation. Nineteen laboratories utilized exhaust fans to ventilate fumes. Of these eight used one fan, seven used two fans, three used one fan with an open door, and one used two fans with an open door. Three laboratories only used open doors for ventilation.

Collected data were examined to determine if any patterns between type of ventilation system and researcher exposure to iron oxide exists. The data is presented in Table 4 . This table answers objective 7. As can be seen in the table, no clear tendencies or patterns exist. It can be seen that in a majority (17) of the laboratories, the ventilation system actually increased exposure to iron oxide particulates.

Table 3. Samples and Projected Concentration versus OSHA Standard of 5 mg/m3 in One 24-hour Period.

School	Mg/M3	OSHA +/-	50 mn.eq.	OSHA +/-	8 hour eq.	OSHA +/-	Min. til OSHA
1	0.38	-4.63	1.88	-3.13	18.00	13.00	133.33
2	0.34	-4.66	1.71	-3.29	16.40	11.40	146.34
3	1.64	-3.36	8.19	3.19	78.60	73.60	30.53
4	0.76	-4.24	3.79	-1.21	36.40	31.40	65.93
5	0.54	-4.46	2.69	-2.31	25.80	20.80	93.02
6	0.94	-4.06	4.71	-0.29	45.20	40.20	53.10
7	0.31	-4.69	1.56	-3.44	15.00	10.00	160.00
8	0.69	-4.31	3.46	-1.54	33.20	28.20	72.29
9	0.88	-4.13	4.38	-0.63	42.00	37.00	57.14
10	12.37	7.37	61.85	56.85	593.80	588.80	4.04
11	30.00	25.00	150.00	145.00	1440.00	1435.00	1.67
12	1.78	-3.22	8.92	3.92	85.60	80.60	28.04
13	5.88	0.88	29.38	24.38	282.00	277.00	8.51
14	2.08	-2.92	10.42	5.42	100.00	95.00	24.00
15	0.77	-4.23	3.83	-1.17	36.80	31.80	65.22
16	7.08	2.08	35.42	30.42	340.00	335.00	7.06
17	0.76	-4.24	3.81	-1.19	36.60	31.60	65.57
18	3.56	-1.44	17.79	12.79	170.80	165.80	14.05
19	1.13	-3.88	5.63	0.63	54.00	49.00	44.44
20	0.05	-4.95	0.27	-4.73	2.60	-2.40	923.08
21	0.74	-4.26	3.69	-1.31	35.40	30.40	67.80
22	1.46	-3.54	7.29	2.29	70.00	65.00	34.29
23	0.58	-4.42	2.92	-2.08	28.00	23.00	85.71
24	0.10	-4.90	0.52	-4.48	5.00	0.00	480.00
25	1.03	-3.97	5.15	0.15	49.40	44.40	48.58
26	0.31	-4.69	1.56	-3.44	15.00	10.00	160.00
27	0.68	-4.32	3.40	-1.60	32.60	27.60	73.62
28	5.17	0.17	25.83	20.83	248.00	243.00	9.68
29	0.36	-4.64	1.79	-3.21	17.20	12.20	139.53
Mean	2.84	-2.16	14.20	9.20	136.32	131.32	106.78
SD	5.87	5.87	29.34	29.34	281.63	281.63	181.28
Median	0.77	-4.23	3.83	-1.17	36.80	31.80	65.22

Table 4. Effects of Ventilation System Type on Researcher Exposure.

System Type	Number Improving Exposure	Number Worsening Exposure
Wall Fans	5	4
Ceiling Fans	1	3
Portable Fan	0	1
Canopy Hood	2	3
Ducts	1	1
Open Door	1	2
Combinations	2	3
Totals	12	17

CONCLUSIONS AND RECOMMENDATIONS

The analysis of the data collected from the area agricultural mechanics laboratories revealed that:

1. Samples taken with the ventilation system on yielded researcher exposures ranging from 0.05 mg/m^3 to 30.00 mg/m^3 with a mean of 2.84 mg/m^3.
2. Samples taken with the ventilation system off yielded researcher exposures ranging from 0.13 mg/m^3 to 18.88 mg/m^3 with a mean of 1.93 mg/m^3.
3. Ventilation systems increased researcher exposure to iron oxide by a mean average of 0.91 or a mean increase of 89.47%.
4. Most area laboratories did not exceed OSHA standards in 10-minute samples.
5. More than half of all area laboratories did not exceed OSHA standards when 50-minute exposures were projected.
6. All but one of the area laboratories exceeded OSHA standards when eight-hour exposures were projected.
7. Area laboratories produced a range of 1.67 minutes to 923.08 minutes of continuous welding prior to reaching OSHA standards, with a mean average of 106.78 minutes.
8. Most area high schools utilize exhaust fans for agricultural mechanics welding laboratory ventilation, with wall and ceiling fans being the most prevalent location type.
9. No convincing evidence of a relationship between ventilation system type and researcher exposure to iron oxide was collected.

The following conclusions were drawn from the results of this study:

1. Most ventilation systems currently being used in area agricultural mechanics laboratories fail to reduce iron oxide exposure levels, and actually increase the amount of particulate entering the breathing zone.
2. Few laboratories exceed OSHA standards in blocks of time measuring 50 minutes or less.
3. Nearly all laboratories would exceed OSHA standards in eight-hour continuous welding sessions.
4. The mean average for area agricultural mechanics welding laboratories for continuous minutes of welding before OSHA standards were reached was 106.78 minutes.
5. Most area agricultural mechanics laboratories utilize exhaust fans for ventilation of welding laboratories.
6. The type of system used did not effect iron oxide exposure level.

Based on the results and conclusions, the following recommendations are provided:

1. The incidence of increased iron oxide exposure with the use of certain ventilation systems should be investigated.
2. Variables should be isolated to determine the effects they have on iron oxide exposure. Some possibilities are: juxtaposition of the ventilation system in relation to the welder, size of the fan, speed of the fan, flow rate at the ventilation system, flow rate at the breathing zone, etc.
3. Agriscience instructors should utilize the "minutes to OSHA" information for their laboratory to plan instructional time.
4. Agriscience instructors should observe smoke patterns during the course of welding laboratories in their school.
5. Agriscience instructors should have their individual laboratories evaluated.
6. Agriscience instructors should consider the use of respiratory protection measures for themselves, their students and visitors to their laboratories.

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The Feasibility of Implementing a Farm Business Management Program for Farmers in Northeast Texas

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INTRODUCTION AND THEORETICAL FRAMEWORK

Since the beginning of organized agriculture, farmers have made hundreds of advancements in their farming and agricultural practices. From hybridization of corn for increased yield to improved livestock genetics, to Eli Whitney's cotton gin, the United States has become a society based on achievements.

Texas has adapted many innovations and practices. But, some states have surpassed Texas in certain arenas of agriculture, specifically in the area of adult education for farmers. Adult education in agriculture is a very diverse subject. The types of programs are also very different from state to state.. The Smith-Hughes Act of 1917 established a national system of vocation education. As programs were being organized in each state, they evolved differently, each with its own set of goals. In some states, the only form of adult education has been the Young Farmer Organization. Other states have taken adult education a step further and have developed their own concepts.

For example, over forty years ago, Minnesota, a front runner in Adult Farm Business Management (FBM) education established a program known as the Minnesota Farm Business Management Program. In 1991, this program was refined to a six year course and began giving college credit to farmers through courses affiliated with the Minnesota Technical College System (Persons, 1991). The program was revised to meet the ever changing needs of the local farmers and ranchers.

In Illinois, the State Board of Education, Department of Adult, Vocational, and Technical Education (DAVTE) funded a program to assist the development and start up of additional Young Farmer Programs throughout the state (Harzman, 1981). Missouri uses a program called Farm Business Management Analysis (FBMA). This program consists of classroom instruction, on-site instruction, and record analysis (Rohrbach & Chapman, 1984). It is fashioned after the Minnesota model.

Other states have utilized high school agricultural science instructors to carry on such farm business management (FBM) programs. Zuck (1978) found that in Oklahoma, the Young Farmers primary facilitator was the high school agricultural science instructor. Christmas (1990) reported on research conducted with Ohio superintendents, principals and instructors. He stated that they were all in agreement that the vocational agriculture instructor was competent to teach and that they should be conducting the adult programs. Cepica (1981) reported that one-fourth of adult educational programs were organized by vocational agriculture instructors.

Birkenholz and Maricle (1991) reported there were a total of 411 full-time instructors of adult education in agriculture in the nation. In the same study, approximately 75% of all respondents said it would be ideal for every agricultural education program to have an adult component. They also reported that many secondary agriculture instructors provided adult instruction along with their full-time high school teaching responsibilities.

What are the benefits to enrolling in a Farm Business Management Program? In Minnesota, the average income of the general farm population from 1981 to 1985 was $18,340 with a range of $15,397 to $22,498. During this same period the average income of those enrolled in a FBM program was $27,168 with a range of $24,359 to $33,935, thus showing economic benefits for being enrolled in a FBM program (Persons, Lehto, Casey, Wittenberger, 1987).

Participants in the Developing Rural Agriculture Program of Central Wisconsin saw their "milk production averaged 403 lbs. more per cow. Crop value per acre increased 22%. Net cash operating income increased 165%!" (Roehl, 1981). Some farmers have found errors in elevator contracts as a result of the increased record keeping from enrollment in an adult education program (Starling & Ware, 1978). Pork producers in Ohio enrolled in an adult educational program analyzed their farm records and compared them to their peers. They found their feed conversion was substandard compared to industry averages. The solution, upon investigation, turned out to be a simple adjustment in the automatic feeder (Starling and Ware, 1978).

Not only does the farmer benefit from enrollment in a FBM program, so does the community. A Minnesota study of 3500 business records of enrolled farmers showed that the farmers could expect to realize about $4.00 of labor earnings for each dollar of investment in a FBM educational program. When stimulated business activity was the benefit measure, the benefit rose to 9:1, resulting in a multiplying effect with a return of 36:1 to the community. That is, for every dollar invested in a FBM educational program, it stimulated $36.00 of new business in the community (Persons, Swanson, Kittleson, Leske, 1968).

In Texas, a major facilitator of farm management instruction has been the County Extension Service. Recently, a computer program was developed where ranchers could compare themselves to others in the cow-calf industry. The Standardized Performance Analysis (SPA) program identifies the areas in a rancher's beef operation that are not economical (Lee, 1993). However, Texas does not have any form of organized financial record keeping programs or adult farm business management programs for all farmers in the state.

Changes in government regulations have been implemented requiring farmers and ranchers who desire loans through Farmers Home Administration (FmHA) to participate in a farm management program. Currently, there is no organized, long-term program in the state to meet the financial and production management needs of the Texas farmer or rancher. Texas needs to develop a program to meet the needs of its farmers and ranchers.

If a formal educational program in farm business management were to be considered for implementation in Texas, researchers needed to determine:

1. Were farmers interested in a formal program in farm business management?
2. What areas of instruction the farmers felt was important?
3. Would high school agricultural science instructors teach the program?
4. Would agricultural science instructors have to be retrained?

PURPOSE AND OBJECTIVES

The purpose of this study was to determine if farmers in Northeast Texas desired a program in farm business management and if high school agricultural science instructors would be willing to teach a program in adult farm business management in their community. The study sought to determine what areas of farm management farmers felt were the most important in a farm business management program versus the topics the instructors felt was important to be included in a farm business management program. The study was guided by the following questions:

1. Do farmers want a formal program in adult farm business management?
2. What do farmers feel is important in a FBM program?
3. How many instructors would be willing to teach a FBM program under their current contract or with additional compensation?
4. What topics did the instructors feel should be included?
5. Would retraining be necessary for the instructors and on what subjects?
6. What adult education programs are currently offered in their community?

METHODS AND PROCEDURES

Population and Sample

The population consisted of all farmers in thirty-three counties in northeast Texas. A random sample was made by the Texas Agricultural Statistics Service (TASS). Those selected were surveyed by telephone. There were 552 completed questionnaires used in the final study.

The population surveyed also included all high school agricultural science instructors in Northeast Texas. The 303 names and addressees were acquired from the Texas Education Agency.

Questionnaire Development

The review of literature showed that farmers in other states benefited from enrolling in a farm business management program. A series of questions were formulated by the researcher to help determine specific facts about the farmers and their perceptions of farm management in Texas. The bulk of the questionnaire was based on the Minnesota Task Analysis (1990) where individuals enrolled in the FBM program were asked to rank topics as to the topic's importance as it related to FBM. The top 42 choices in the Business Planning section were used in this study. A panel of experts was used to help determine validity and appropriateness. The questionnaire was presented to an Agricultural Workers group in the community, for review and suggestions. The focus group process was then used with a group of agricultural education students who where also actively involved in farming on their own. The questionnaire mailed to the instructors was also formulated in this manner.

Data Collection

The questionnaire for the farmers was administered via telephone by employees of the Texas Agriculture Statistics Service (TASS). The sample was chosen at random by computer from the data bank at TASS. There was a return rate of 552 usable questionnaires. The questionnaire presented to high school agriculture instructors was constructed and data was collected following methods outlined by Dillman (1978) to increase response rate. Every instructor in Northeast Texas was mailed a questionnaire containing a cover letter asking them to complete and return the form. A reminder post-card and a second follow up cover letter and questionnaire were mailed to all non-respondents. There was a gross return rate of 79.5% (241) from the population. Of those, 239 (78.9%) were usable in the study.

Data Analysis

Percentages, frequencies, and means were determined for the data contained in the questionnaire. The instructors and farmers were analyzed statistically as separate groups. The data was analyzed using SPSS (1990) Statistical Software.

RESULTS AND/OR FINDINGS

Demographic Information of the Farmers

- The average age of the farmers surveyed was 54.8 years old
- The farmer respondents were 92.8 percent male and 7.2 percent female.
- 55.5 percent of the farmers had some post high school education.
- They had farmed an average of 29 years.
- 33.3% of the farmers had gross farm sales of less than $50,000, 26.1% of the farmers had sales between $50,000 - $99,000, 40.6% had sales $100,000+.

Demographic Information of the Instructors

- 90.4% of the instructors held Bachelor Degrees in Agricultural Education.
- 25.3% held BA/BS degrees, 25.7% had completed some graduate work, 31.6% held Masters Degrees, and 17.3% had completed work above their Masters.
- The average instructor was 39.2 years old and had taught 14.7 years, with 11.3 years at their present school.

General Findings

- Only 33.8% (80) of the instructors reported that adult educational programs were offered in their community, and these were primarily taught by the high school agricultural department or the Extension Service.
- Training specifically in Farm Business Management was offered in only 13.6% of the instructor's communities.
- Forty (40) instructors (16.8%) said they would be willing to teach a course in FBM under their current contract, and an additional 68 instructors (34.3%) said they would teach a program if they were given additional compensation.
- Three hundred and thirty-five (61.2%) of the farmers who responded said they would be interested in a farm management program if one were offered in their community.

- Three hundred and sixty nine (78.3 %) of the farmers and ranchers who responded to the question said they believed other farmers or ranchers in their community would enroll in a farm management program.
- Sixty-three percent of the respondents felt the evening would be the most convenient time of day.
- 70.9% of the farmers and ranchers felt Monday, Tuesday or Wednesday would be the most convenient day.
- 62.6 percent of the farmers and ranchers said the most convenient place to enroll would be the local high school or community center.

Choices of topics to be included in a program according to Farmers.

Table 1 illustrates the means and ranks of the top half of the forty-two topics to be included in a FBM program. The topics had a possible rating from 1 to 5. One was the lowest rating and indicated the topic should not be included in a FBM program. A rating of 5 indicated the farmer felt the topic should definitely be included in a program. The ranking of the 21 topics is from the highest mean score to lowest.

Table 1: The top 21 topics chosen by Farmers to be included in a FBM program.

	Topic	Mean
1.	Developing a Record Systems	4.04
2.	Keeping Income Tax Records	4.02
3.	Maintain Income Records	3.99
4.	Maintain Expense Records	3.94
5.	Maintain Livestock Production Records	3.92
6.	Closing Records at Year's End	3.87
7.	Apply Emergency First Aid Techniques	3.74
8.	Prepare Profit/Loss Statements	3.72
9.	Prepare Cash Flow Statements	3.70
10.	Prepare Farm Budgets	3.69
11.	Long Range Family-Business Goals	3.66
12.	Prepare Farm Management Plan	3.63
13.	Maintain Crop Production Records	3.60
14.	Prepare an Inventory of Assets and Liabilities	3.54
14.	Manage Personal Stress	3.54
16.	Develop Self Motivation	3.53
17.	Analyze Expense Records	3.52
17.	Analyze Profit/Loss Statements	3.52
17.	Develop Positive Attitudes	3.52
17.	Develop Positive Relationships	3.52
17.	Short Range Family Business Goals	3.52

Choices of topics to be included in a program according to Instructors.

Table 2 illustrates the instructors' mean and rank of the top half of the topics that should be included in a Farm Business Management program. The topics had a possible rating from 1 to 5. One was the lowest rating and indicated the topic should not be included in a program. A rating of 5 indicated the instructor felt the topic should definitely be included in a FBM program.

Table 2: The top 21 topics chosen by Agricultural Science Instructors to be included in a FBM program.

	Topics	Mean
1.	Maintain Expense Records	4.51
2.	Keeping Income Tax Records	4.50
3.	Maintain Income Records	4.48
4.	Developing a Record Systems	4.47
5.	Prepare Farm Budgets	4.39
6.	Closing Records at Year's End	4.31
7.	Maintain Livestock Production Records	4.27
8.	Prepare Profit/Loss Statements	4.24
9.	Prepare Farm Management Plan	4.18
10.	Prepare an Inventory of Assets and Liabilities	4.15
10.	Prepare Cash Flow Statements	4.15
12.	Maintain Crop Production Records	4.05
13.	Prepare Loan Applications	4.00
14.	Analyze Profit/Loss Statements	3.92
15.	Prepare Enterprise Projection Budgets	3.89
16.	Analyze Cash Flow Statements	3.86
17.	Long Range Family-Business Goals	3.82
17.	Analyze Expense Records	3.82
17.	Analyze Government Programs	3.82
20.	Short Range Family Business Goals	3.79
20.	Analyze Balance Sheets	3.79

The top five topics to be included in a FBM program center around records and record keeping according to both farmers and instructors.

Texas farmers and ranchers, high school instructors and the Minnesota Farmers surveyed in the Minnesota Task Analysis of 1990 all had similar ideas of what should be included in a Farm Business Management Curriculum. Table 3 illustrates the top ten topics as chosen by Texas Farmers and the corresponding rank by the instructors and Minnesota farmers.

Table 3: Comparison of Ranks of Texas farmers, instructors and Minnesota farmers.

	Rank	
Top Ten Topics as Chosen By Texas Farmers	**Texas Instructors**	**Minnesota Farmers**
1. Develop a record system	4	3
2. Keeping income tax records	2	11
3. Maintaining income records	3	2
4. Maintaining expense records	1	1
5. Maintaining livestock production records	7	6
6. Closing records at years end	6	18
7. Apply emergency first aid techniques	35	16
8. Preparing profit/loss statements	8	28
9. Preparing cash flow statements	10	14
10. Prepare farm budgets	5	13

Only a visual observation could be made in the relationship between the three groups. The Minnesota farmers were well versed in the terminology used in the description of the topics whereas the Texas farmer and the instructors may not have been. Therefore, the researcher believes, based on a visual observation, that there was a similarity in the responses of the three groups.

All of the subject groups had three of the top four topics the same. The top choices by the subject groups all center around types of record keeping. Additionally, Texas farmers and the instructors had nine out of ten topics in the top ten. Texas farmers versus Minnesota farmers had nine of the same topics to be included in a FBM program in the top 15.

CONCLUSIONS AND/OR RECOMMENDATIONS

Conclusions

1. Farmers are willing to enroll in a farm management program, if one were developed to meet their needs.
2. Farmers also believed their peers would be willing to participate in the program.
3. To accommodate the farmer, the best place of instruction would be the local high school or community center, preferably during the first part of the week, in the evenings.
4. In order to get the farmer and rancher to enroll, costs must be kept reasonable or the farmer or rancher must be convinced that they are going to benefit from the increased cost.

5. Farmers indicated maintaining records the most important topics in a FBM educational program. Any program designed for farmers and ranchers in Northeast Texas be structured around teaching a farmer how to accurately keep records and their analysis.
6. High school agricultural science instructors are willing to teach a course in adult education in Farm Business Management. They should be used as a resource to begin a FBM program in Northeast Texas.
7. More instructors would be willing to teach a program if they were given additional compensation. Avenues for funding additional salaries for these instructors should be sought.
8. According to the instructors, record keeping is a highly important aspect of a farm management program. It should be the central topic for any farm management program offered by the instructors.
9. Along with developing a suitable curriculum for the farmers and ranchers, a curriculum to train the high school instructor needs to be developed.
10. Adult education programs are lacking in the thirty-three counties included in Northeast Texas. A formal program in farm business management is needed.
11. Community leaders, superintendents, principals, bankers, farmers, and ranchers need to be shown the advantages of having a FBM program in their community. A marketing program needs to be developed to illustrate the value of a FBM program to these individuals.

Recommendations

1. A curriculum of instruction should be developed for a FBM program in Northeast Texas. It should be based on the Minnesota Model. This model has not only been proven successful in Minnesota, but it is also the most adopted version of FBM education in the nation.
2. When a formal, organized educational program in adult Farm Business Management is begun in Northeast Texas and VI in Texas, it should center primarily around record keeping and record analysis, both income and expense. These are the topics that the farmers felt were the most important to be included in a FBM program. Any new program must cater to the needs and desires of those who wish to enroll.
3. A promotional campaign should be developed to promote the benefits of FBM education to the farmers and ranchers. This would further justify the costs associated with conducting a comprehensive FBM education program.
4. The farmers and ranchers indicated that the most convenient place for them to enroll in a FBM program would be the local high school. The local high school has the necessary facilities for instruction. High School Agricultural Science instructors indicated that they would be willing to teach a FBM program. It is recommended that the place of instruction be local high schools and the primary facilitator of FBM educational programs be the High School Agricultural Science and Technology instructors.

5. Although the instructors do have a knowledge of some of the principles of FBM, it is recommended that a comprehensive training and certification program be developed for the instructors to enable them to properly teach a FBM education program.
6. The instructors must be compensated for their efforts. Not only will this attract more potential and competent instructors, but it will also enable the governing body of FBM in Texas to have guidelines on what should be taught and how it will be taught.
7. Using the methodology used in this study, additional research should be conducted in other areas of Texas and other states. This would enable researchers to get a comprehensive picture of what farmers and ranchers want in FBM. It would also give researchers data to use for legislative funding for monetary support. It would also give researchers an idea of how many instructors would be interested teaching this program and how many students are potentially available.

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PERCEPTIONS BY THE NURSERY INDUSTRY OF THE HIGHER EDUCATION HORTICULTURAL NEEDS OF BEGINNING EMPLOYEES

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PERCEPTIONS BY THE NURSERY INDUSTRY OF THE HIGHER EDUCATION HORTICULTURAL NEEDS OF BEGINNING EMPLOYEES

INTRODUCTION

As a result of a historic educational summit held in Charlottesville, North Carolina in the Autumn of 1989 with the President and state governors; clear national performance goals were established (The Office of the President, 1990). These national educational goals were developed in an effort to make the US more competitive in an international marketplace. This same report indicated that the initial step to improving the quality of higher education in the US involves the establishment of a public-private partnership. Certainly such a partnership is not possible without substantial industry input into curricular decisions.

In a report by the National Research Council (1992), H.O. Kunkel of Texas A&M University stated the following regarding industry and academia:

> ...businesses are finding it increasingly difficult to employ, retain, and reward people to compete in a technology-driven world economy. Recruitment of students and continuing education are needed, and industry has a role and responsibility in both areas. Industry-academic linkages should be fostered and seen on campus. Colleges of Agriculture should give attention to the executive potential in students and graduates and should help them to obtain "combat" experience in business, such as through internships (p.5).

Prior to substantial curricular modifications in higher education, a divergent phase of data collection from stakeholders (students, industry, and faculty) is essential

(Merritt & Hamm, 1994). Although higher education has been criticized regarding the absence of industry input in the decision making process (Long, Straquadine, & Campbell, 1992), such input is especially important in the horticultural sciences due to rapid advances being made in technology.

Determining what should be included in the higher education curriculum is extremely important in the nursery industry due to the immediate employment implications for students. Students enrolled in programs of higher education need reassurance that the skills and abilities that they learn will be meaningful to their future employment goals. In addition, the nursery industry needs reassurance that what is taught in higher education is consistent with "real world" needs.

PURPOSE AND OBJECTIVES

The purpose of this study was to determine the essential knowledge areas for students entering the nursery industry. Specific objectives of the study were to:

(1) describe the background characteristics of nursery industry representatives; and

(2) determine the horticultural sciences knowledge areas essential for technical level employees (maintenance and sales assistants; technical workers; yard employees; general laborers; landscape laborers; general nursery workers) and managerial level employees (garden center managers; sales and marketing representatives; crew foremen; supervisors; department heads) entering the nursery industry.

PROCEDURES

The following research procedures will be addressed: (1) population and sample; (2) instrumentation; (3) research design, (4) data collection; and (5) data analysis.

Population and Sample

The target population for the study consisted of 862 members of the California Association of Nurserymen (CAN) based upon a population frame supplied to the researchers by CAN. The researchers carefully purged the list of duplicated names to control for selection error.

A random sample of 270 members was selected to participate in the study following procedures suggested by Krejcie and Morgan (1970). This sample size resulted in a margin of error of five percent. The members in the sample represented every geographical region of the state.

Instrumentation

A mail questionnaire was developed with the procedures suggested by Dillman (1978). The instrument was initially reviewed by the CAN Education and Career Committee for content and face validity. It was then revised based upon the Committee's recommendations and field tested on a subsample of the population consisting of 40 CAN members not included in the sample of 270, for the purpose of establishing the reliability of the instrument. This resulted in a Cronbach's alpha reliability coefficient of $r = .80$ or greater for each of the content areas included in the instrument.

Research Design

This study was descriptive in nature.

Data Collection

The instrument (including a cover letter and a self-addressed stamped envelope) was mailed to the sample of 270 members for data collection in Fall, 1993. Approximately two weeks later, another copy of the instrument was mailed to nonrespondents. The two mailings resulted in a response rate of 42%.

For the purpose of controlling nonresponse error, a statistical comparison was made between responses received after the initial mailing and responses received after the final mailing. No statistically significant differences were found between the two groups. As a result (based upon a procedure forwarded by Miller and Smith, 1983), the researchers concluded with confidence that the data were representative of the entire sample of 270 members.

Data Analysis

The data were analyzed using the SPSS/PC+ statistical software program.

RESULTS

Initially demographic information on the respondents will be discussed. Secondly, a summary of the respondents' perceptions of preferred knowledge areas for technical level and managerial level employees will be presented.

CAN Member Characteristics

The respondents revealed that they had currently been employed in their present nursery-related organization for 18 years (sd = 12.19), with a range from one year to 60 years. They had been employed in the nursery industry for an average of 22 years (sd = 11.73). Typically they represented businesses that operated in one primary location (80.5%). In addition to being a CAN member, they also were members of an average of 2.5 professional organizations (sd = 3.73).

In terms of educational background, 23% of the respondents either had attended a community college or held a community college degree. In terms of their specific majors, most were either agricultural majors, business-oriented majors, or majored in general education.

About one-half of the respondents either attended a baccalaureate granting institution or had graduated from one. Included in this group were the 15% who held a graduate degree. Their academic majors were diverse. College majors included agriculture (agricultural economics, animal production, environmental horticulture, forestry, landscape architecture, ornamental horticulture, viticulture, soils), business management, mathematics, history, sociology, psychology, and botany. None of the respondents had less than a high school degree.

Most of the respondents held a managerial level position in their respective organizations. The backgrounds included owners, presidents, sales managers, vice-presidents, buyers, and foremen.

Essential Knowledge Areas for Beginning Employees

Four constructs were included in the questionnaire related to specific knowledge areas for beginning employees. The respondents were asked to respond to specific knowledge areas in each construct regarding their perceptions as to the importance for both technical level and managerial level employees. A four point Likert-type scale was used in measuring responses. For the purpose of summarizing the specific items when the responses were averaged, the following scale was used for interpretation purposes:

Mean Response	Interpretation
Less than 1.5	Not Important
1.6 - 2.5	Below Average Importance
2.6 - 3.5	Above Average Importance
3.6 or Greater	Extremely Important

Knowledge of Plants

Eight specific knowledge areas were included in the plant knowledge construct (Table 1). All of the skills were perceived as being of above average importance for technical level employees. The following specific knowledge areas were identified as being most important: (1) plant identification (x = 3.44, sd = 0.76); (2) cultural requirements (x = 3.18, sd = 0.83); (3) soil/fertilizer relationships (x = 2.97, sd = 0.87); and (4) pesticide formulations (x = 2.96, sd = 0.94).

In terms of plant knowledge for managerial level employees, once again all items were viewed as being of above average importance. However, as was the case in most of the constructs, the level of importance of specific knowledge areas were slightly different from those identified for technical level employees. The specific rankings (listed from most important to least important) were: (1) plant identification (x = 3.45, sd = 0.66); (2) cultural requirements (x = 3.26, sd = 0.76); (3) soil/fertilizer relationships (x = 3.24, sd = 0.71); and (4) integrated pest management (x = 3.19, sd =0.74).

Table 1
Means, Standard Deviations, and Rankings for Plant Knowledge (n = 113)*

	Technical Level			Managerial Level		
Item	Mean	SD	Rank	Mean	SD	Rank
Plant identification	3.44	0.76	1	3.45	0.66	1
Cultural requirements	3.18	0.83	2	3.26	0.76	2
Soil/fertilizer relationships	2.97	0.87	3	3.24	0.71	3
Pesticide formulation	2.96	0.94	4	3.14	0.86	5
Integrated pest management	2.93	0.89	5	3.19	0.74	4
Tree pruning techniques	2.93	0.87	6	2.90	0.84	6
Drought tolerant plant materials	2.67	0.93	7	2.84	0.94	7
Plant propagation including tissue culture	2.65	1.01	8	2.82	0.97	8

* Based upon a four point, Likert-type scale where = 1 not important, 2 = below average importance, 3 = above average importance, and 4 = extremely important.

Knowledge of Irrigation Practices

Five specific knowledge areas were included in the irrigation practices construct. At both the technical level and the managerial level, the knowledge areas were viewed as being of above average importance. The following were viewed as being most important at the technical level (Table 2): (1) water conservation techniques (x = 2.87, sd = 0.84); (2) drip irrigation (x = 2.82, sd = 0.87); and (3) irrigation troubleshooting (x = 2.81, sd = 0.94). At the managerial level, the following were identified: (1) water conservation techniques (x = 3.03, sd = 0.86); (2) irrigation design (x = 2.82, sd = 0.89); and (3) drip irrigation (x = 2.75, sd = 0.87).

Table 2
Means, Standard Deviations, and Rankings for Irrigation Practices (n = 113)*

	Technical Level			Managerial Level		
Item	Mean	SD	Rank	Mean	SD	Rank
Water conservation techniques	2.87	0.84	1	3.03	0.86	1
Drip irrigation	2.82	0.87	2	2.75	0.87	3
Irrigation troubleshooting	2.81	0.94	3	2.72	0.93	4
Irrigation installment	2.97	0.98	4	2.66	0.92	5
Irrigation design	2.59	0.97	5	2.82	0.89	2

* Based upon a four point, Likert-type scale where = 1 not important, 2 = below average importance, 3 = above average importance, and 4 = extremely important.

Knowledge of Construction and Mechanics

Only two knowledge areas were included in this construct. Pertaining to technical level employees, general construction (structures and utilities) was perceived to be of below average importance (x = 2.38, sd = 0.99). Landscape equipment operation and maintenance was believed to be of above average importance (x = 2.71, sd = 1.03) for this same group (Table 3).

When asked of the importance of these two knowledge areas for managerial level employees, both were rated as being of above level importance. Landscape equipment operation and maintenance (x = 2.63, sd = 1.03) was rated slightly higher than general construction (structures and utilities) (x = 2.61, sd = 0.96).

Table 3
Means, Standard Deviations, and Rankings for Construction and Mechanics (n = 113)*

	Technical Level			Managerial Level		
Item	Mean	SD	Rank	Mean	SD	Rank
Landscape equipment operation & maintenance	2.71	1.03	1	2.63	1.03	1
General construction (structures & utilities)	2.38	0.99	2	2.61	0.96	2

* Based upon a four point, Likert-type scale where = 1 not important, 2 = below average importance, 3 = above average importance, and 4 = extremely important.

Knowledge of Regulations and Laws

Regulations and laws consisted of four specific knowledge areas. Three of the four areas were identified as being of below average importance for technical level employees (Table 4). The additional knowledge area (knowledge of pesticide regulations) was perceived to be of above average importance (x = 3.02, sd = 0.94).

In terms of managerial level employees, all of the knowledge areas were thought to be of above average importance. The most important knowledge areas were: (1) knowledge of labor laws (x = 3.42, sd = 0.84) and (2) knowledge of pesticide regulations (x = 3.41, sd = 0.80).

Table 4
Means, Standard Deviations, and Rankings for Regulations and Laws (n = 113)*

Item	Technical Level Mean	Technical Level SD	Technical Level Rank	Managerial Level Mean	Managerial Level SD	Managerial Level Rank
Pesticide regulations	3.02	0.94	1	3.41	0.80	2
Water conservation laws	2.37	0.96	2	3.08	0.91	3
Labor laws	2.37	0.96	3	3.42	0.84	1
Green waste management regulations	2.33	0.86	4	2.99	0.89	4

* Based upon a four point, Likert-type scale where = 1 not important, 2 = below average importance, 3 = above average importance, and 4 = extremely important.

Recommendations and Conclusions

As a result of this study focusing on a limited population, the researchers would caution against the generalization of these findings beyond CAN members. The respondents in this study appeared to be highly knowledgeable of the nursery industry based upon their experience in the industry. The respondents tended to represent business organizations in one geographic location, and were relatively active in professional organizations. In addition, the respondents could be described as being highly educated with a great deal of heterogeneity in terms of educational background. The respondents tended to represent management, which leaves one to ask if nonmanagerial employees were asked these same questions, would they have responded in a similar manner?

Whether entering as a technician or as a manager, the industry expects its beginning employees to be knowledgeable of plants. Some of the knowledge areas that were identified as being important to the preparation of managers were not viewed as being particularly important to technicians. Managerial level employees are expected to be knowledgeable of irrigation design, water conservation laws, labor laws, and green waste management regulations.

Although the essential knowledge areas identified in this study provide excellent baseline information which can be utilized in the curriculum development and review processes, some degree of caution should be used in an effort not to overgeneralize the findings. Readers need to keep in mind that the study results were averaged without regard to type of business or location. In determining knowledge areas to be included in the curriculum, it is essential that regional industry needs be considered, especially in a state as diverse as California. For instance, water conservation is probably of greater concern to Southern California nursery industry representatives, wherein some areas of the state, water conservation concerns may not be as important as other concerns. The accuracy of these findings would certainly be enhanced if small focus groups of industry representatives were used in validating the findings.

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PERCEPTIONS BY THE NURSERY INDUSTRY OF THE HIGHER EDUCATION SUPPORT COURSE NEEDS OF BEGINNING EMPLOYEES

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INTRODUCTION

The nursery industry is in a period of transition from a production orientation to a market orientation (Garber & Bondari, 1992). Representing the seventh largest agriculturally-related industry in this country, this industry typically consists of a large number of small and medium sized firms (Hodges & Haydu, 1992). These firms have had historical concerns with lower labor productivity. In an article published by the Southern Nursery Digest, John Woeste, Dean of Extension at the University of Florida (Staff, 1992) predicted that nursery businesses of tomorrow must employ competent business managers in order to survive future market demands.

In 1994, Khatamian and Stevens reported that consumers of landscape/nursery plants identified an educated, professional sales staff as being very important to them when making purchasing decisions. Although graduate follow-up studies have revealed that horticultural graduates are generally pleased with current programs (Wrye & Terry, 1993; Long, Straquadine, & Campbell, 1992), horticulture knowledge alone is not necessarily adequate in preparing for future employment in the industry (Marciel, 1994).

A number of nontechnical competencies have been identified as being important to the success of the college graduate. Radhakrishna and Bruening (1994) revealed that employees and students valued interpersonal skills, business and economic skills, and communication skills. Long et al., (1992) indicated that graduates value knowledge in the computer sciences and oral and written communications. Marciel (1994) reported that nursery employers should look for communication skills, attendance, and appearance when hiring new employees. In addition, a number of scholars have advocated the need for practical work experience (McConnell & Yeager, 1990; Merritt & Hamm, 1994).

PURPOSE AND OBJECTIVES

The purpose of this study was to determine the essential knowledge areas for students entering the nursery industry as perceived by representatives currently employed in the industry. Specific objectives of the study were to:

(1) describe the preferred background characteristics of nursery industry employees; and

(2) determine the supportive course knowledge areas essential for technical level employees (maintenance and sales assistants; technical workers; yard employees; general laborers; landscape laborers; general nursery workers) and managerial level employees (garden center managers; sales and marketing representatives; crew foremen; supervisors; department heads) entering the nursery industry.

PROCEDURES

The following research procedures will be addressed: (1) population and sample; (2) instrumentation; (3) research design, (4) data collection; and (5) data analysis.

Population and Sample

The target population for the study consisted of 862 members of the California Association of Nurserymen (CAN) based upon a population frame supplied to the researchers by CAN. The researchers carefully purged the list of duplicated names to control for selection error.

A random sample of 270 members were selected to participate in the study following procedures suggested by Krejcie and Morgan (1970). This sample size resulted in a margin of error of five percent. The members in the sample represented every geographical region of the state.

Instrumentation

A mail questionnaire was developed with the procedures suggested by Dillman (1978). The instrument was initially reviewed by the CAN Education and Career Committee for content and face validity. It was them revised based upon the Committee's recommendations and field tested on a subsample of the population consisting of 40 CAN members not included in the sample of 270, for the purpose of establishing the reliability of the instrument. This resulted in a Cronbach's alpha reliability coefficient of $r = .80$ or greater for each of the content areas included in the instrument.

Research Design

This study was descriptive in nature.

Data Collection

The instrument (including a cover letter and a self-addressed stamped envelope) was mailed to the sample of 270 members for data collection in Fall, 1993. Approximately two weeks later, another copy of the instrument was mailed to nonrespondents. The two mailings resulted in a response rate of 42%.

For the purpose of controlling nonresponse error, a statistical comparison was made between responses received after the initial mailing and responses received after the final mailing. No statistically significant differences were found between the two groups. As a result (based upon a procedure forwarded by Miller and Smith, 1983), the researchers concluded with confidence that the data were representative of the entire sample of 270 members.

Data Analysis

The data were analyzed using the SPSS/PC+ statistical software program.

RESULTS

The results will be presented in the following two sections. Initially a summary of the respondents' perceptions of preferred backgrounds for technical level and managerial level employees will be presented. Secondly, support course knowledge areas essential for the success of beginning employees will be summarized.

Preferred Backgrounds of Employees

When asked their perceptions of technical level employees, 46% of the respondents perceived that such individuals should have no more or less than a high school education. Prior to employing a technical level employee, the respondents revealed that they should have 480 hours of field experience in the industry (sd = 716.91). This requirement ranged from no experience to 3000 hours of experience. A technical level employee would receive an annual income of $15,936 (sd = 5236.67). The annual salary ranged from $9,000 to $38,000.

In terms of managerial level employees, 66% indicated that a beginning managerial level employee should have some community college level course work or a community college degree. Over one-quarter of the respondents felt that managerial level employees should hold a baccalaureate degree. The beginning managerial level employee was expected to have over 2588 hours of field experience (sd = 2606.60). The required experience ranged from no experience at all to 10,400 hours of experience. This same employee would receive an annual salary of $24,000 (sd = 6845.13), with a low of $14,000 to a high of $55,000. Sixty percent of the respondents reported that an employee would be expected to be employed in their organization three years prior to being considered for a managerial position in the same organization.

Two Likert-type questions were included regarding the importance of participation in extracurricular activities and professional certifications. The respondents indicated that participation in extracurricular activities by potential employees was of below average importance (x = 2.22, sd = 0.91) based upon a four point Likert-type scale (1 = not important, 4 = extremely important). They also reported that professional certifications were as equally important as formal education for beginning employees (x = 1.95, sd = 0.63) based upon a three-point Likert-type scale (1 = not as important, 3 = more important).

Essential Support Course Knowledge Areas for Beginning Employees

Five constructs (groups of similar knowledge areas) were included in the questionnaire regarding beginning employees. The respondents were asked to respond to specific knowledge areas in each construct regarding their perceptions as to the importance for both technical level and managerial level employees. A four point Likert-type scale was used in measuring responses. For the purpose of summarizing the specific items when the responses were averaged, the following scale was used:

Mean Response	Interpretation
Less than 1.5	Not Important
1.6 - 2.5	Below Average Importance
2.6 - 3.5	Above Average Importance
3.6 or Greater	Extremely Important

Knowledge of Interpersonal Skills

The construct of interpersonal skills consisted of seven knowledge areas (Table 1). Only two of the seven were viewed as being of below average importance for technical level employees (ability to perform organizational planning and personnel management). The remaining knowledge areas were perceived as being of above average importance. The most important areas were: (1) ability to communicate (verbal and written) (x = 3.07, sd = 0.78); (2) application of problem solving techniques (2.98, sd = 0.69); (3) conflict resolution (x = 2.76, sd - 0.88); and (4) leadership skills and techniques (x = 2.69, sd = 0.85).

Unlike interpersonal skills for the technical level employee, for managerial level employees, all but one of the knowledge areas (bilingual competencies) were viewed as being extremely important. The most important knowledge areas for managerial level employees were (1) ability to communicate (verbal and written) (x = 3.75, sd = 0.52); (2) leadership skills and techniques (x = 3.72, sd = 0.55); (3) personnel management (x = 3.71, sd = 0.53); and (4) ability to perform organizational planning (x = 3.68, sd = 0.56).

Table 1
Means, Standard Deviations, and Rankings for Interpersonal Skills (n = 113)*

	Technical Level			Managerial Level		
Item	Mean	SD	Rank	Mean	SD	Rank
Ability to communicate (verbal & written)	3.07	0.78	1	3.75	0.52	1
Application of problem solving	2.98	0.69	2	3.63	0.62	6
Conflict resolution	2.76	0.88	3	3.66	0.62	5
Leadership skills & techniques	2.69	0.85	4	3.72	0.55	2
Bilingual competencies	2.51	0.94	5	2.85	0.91	7
Organizational planning	2.45	0.93	6	3.68	0.56	4
Personnel management	2.40	0.98	7	3.71	0.53	3

* Based upon a four point, Likert-type scale where = 1 not important, 2 = below average importance, 3 = above average importance, and 4 = extremely important.

Knowledge of Marketing and Consumer Information Skills

There were five knowledge areas that represented the construct of marketing and consumer information skills

(Table 2). Clearly the respondents did not value this type of knowledge for technical level employees. All but one of the knowledge areas were rated as being of below average importance for technical level employees. The most highly valued areas were: (1) ability to educate consumers in horticultural practices/techniques (x = 2.71, sd = 1.03); (2) knowledge of marketing concepts (x = 2.30, sd = 0.98); and (3) multicultural understanding (x = 2.29, sd = 0.90).

As might have been anticipated, all of the knowledge areas were valued as being of above average importance for managerial level employees. Identified as being most important were: (1) knowledge of marketing concepts (x = 3.49, sd = 0.65); (2) ability to forecast economic, business, and horticultural trends (x = 3.39, sd = 0.67); and (3) ability to educate consumers in horticultural practices/techniques (x = 3.36, sd = 0.81).

Knowledge of Business Skills

Accounting principles and financial planning were the business skills examined in the study (Table 3). For technical level employees, both were considered as being of below average importance: (1) accounting principles (x = 2.03), sd = 1.03); and (2) financial planning (x = 1.95, sd = 1.04). The opposite was true in regards to managerial level employees. Both financial planning (x = 3.38, sd = 0.75) and accounting principles (x = 3.36, sd = 0.74) were perceived as being of above average importance.

Table 2
Means, Standard Deviations, and Rankings for Marketing and Consumer Information Skills (n = 113)*

	Technical Level			Managerial Level		
Item	Mean	SD	Rank	Mean	SD	Rank
Education consumers of hort. practices	2.71	1.03	1	3.36	0.81	3
Marketing concepts	2.30	0.98	2	3.49	0.65	1
Multicultural understanding	2.29	0.90	3	2.97	0.82	4
Forecast trends	2.05	0.97	4	3.39	0.67	2
Identify market opportunities abroad	1.66	0.88	5	2.53	0.81	5

* Based upon a four point, Likert-type scale where = 1 not important, 2 = below average importance, 3 = above average importance, and 4 = extremely important.

Table 3
Means, Standard Deviations, and Rankings for Business Skills (n = 113)*

	Technical Level			Managerial Level		
Item	Mean	SD	Rank	Mean	SD	Rank
Accounting principles	2.03	1.03	1	3.36	0.74	2
Financial planning	1.95	1.04	2	3.38	0.75	1

* Based upon a four point, Likert-type scale where = 1 not important, 2 = below average importance, 3 = above average importance, and 4 = extremely important.

Knowledge of Computer Related Skills

The construct of computer related skills consisted of two knowledge areas (Table 4). They were understanding computer application packages (spreadsheets, word processing, and data bases) and use of computer assisted design (CAD). For technical level employees, both were considered as being of below average importance. Computer applications (x = 2.04, sd = 1.05) was perceived as being slightly more valuable for technical level employees than CAD (x = 1.95, sd = 1.03). However, both knowledge areas were thought to be of above average importance for managerial level employees. Computer applications (x = 3.13, sd = 0.80) were more highly valued than CAD (x = 2.80, sd = 0.93).

Knowledge of General Education

Five broad knowledge areas made up the construct of general education (Table 5). All of the knowledge areas were perceived as being of below average importance for technical level employees. The most important general education areas for technical level employees were: (1) basic sciences (biology and chemistry) (x = 2.30, sd = 0.88); (2) mathematics (including algebra, geometry, trigonometry, and calculus) (x = 2.20, sd = 0.89); and (3) advanced plant sciences (physiology and pathology) (x = 2.10, sd = 0.98).

Table 4
Means, Standard Deviations, and Rankings for Computer Related Skills (n = 113)*

	Technical Level			Managerial Level		
Item	Mean	SD	Rank	Mean	SD	Rank
Basic computer applications	2.04	1.05	1	3.13	0.80	1
Computer assisted design	1.95	1.03	2	2.80	0.93	2

* Based upon a four point, Likert-type scale where = 1 not important, 2 = below average importance, 3 = above average importance, and 4 = extremely important.

All knowledge areas with the exception of liberal arts were viewed as being of above average importance for managerial level employees. In terms of importance, the following were identified as being equally important: (1) basic sciences (x = 2.80, sd = 0.76); (2) advanced plant science (x = 2.80, sd = 0.90); and (3) mathematics (2.80, sd = 0.79).

Table 5
Means, Standard Deviations, and Rankings for General Education (n = 113)*

Item	Technical Level Mean	Technical Level SD	Technical Level Rank	Managerial Level Mean	Managerial Level SD	Managerial Level Rank
Basic sciences (biology & chemistry)	2.30	0.88	1	2.80	0.76	1
Mathematics	2.20	0.89	2	2.80	0.79	1
Advanced plant sciences (physiology & pathology)	2.10	0.98	3	2.80	0.90	1
Social sciences (psycology & sociology)	1.90	0.84	4	2.60	0.83	4
Liberal arts	1.90	0.84	5	2.50	0.83	5

* Based upon a four point, Likert-type scale where = 1 not important, 2 = below average importance, 3 = above average importance, and 4 = extremely important.

DISCUSSION OF FINDINGS

As a result of this study focusing on a limited population, the researchers would caution against the generalization of these findings beyond CAN members. Entry level technicians should have a high school education, 480 hours of field experience in the industry prior to being employed, and would receive and annual salary of $15,936. It should be pointed out that there was a great deal of disagreement among the respondents regarding work experience expectations prior to employment and beginning salary. This may be a result of the diversity of size and types of businesses that constitute CAN membership. It did seem clear however, that the respondents felt that higher educational programs in horticulture and related areas ought not to be in the business of preparing entry level technicians. Educational programs targeting these types of employment opportunities for their students should be located in the secondary school system.

Two-thirds of the respondents perceived that the preparation of entry level managerial employees should take place in the community college system. The entry level manager was expected to have over 2500 hours of field experience in the industry. This same employee would receive an annual beginning salary of $24,000. Once again, there was a great deal of heterogeneity among the respondents regarding expected field experience and beginning salary.

The respondents seemed to send a mixed message in relation to leadership development. When asked of the importance of extracurricular activities while in college, over 50% indicated that participation was not highly valued. However, when asked to appraise leadership skills and techniques, they perceived that for technical level employees, this knowledge area was of above average importance, and that for managerial level employees, this knowledge area was extremely important. One plausible explanation may be that since about 90% of the respondents continued their education past high school, they may have themselves participated in extracurricular activities. Such participation may not have met their expectations in terms of leadership development. As a faculty member, advising a student organization often means little in terms of retention, tenure and promotion. Therefore, advising a student organization is often not a high priority for faculty.

It should be pointed out however, that participation in extracurricular activities is not the only way that students obtain leadership skills and abilities. Many campuses have developed specific courses in leadership development. Also, often students participating in internships have the opportunity to broaden their repertoire of leadership skills. Finally, many instructors do an excellent job of encouraging leadership development as part of course experiences in technical courses. Having students make group presentations, give speeches, and introduce guest speakers can also enhance leadership development.

The respondents strongly supported professional certifications. Certifications are often very skill oriented, as opposed to resident instruction which often is more broadly designed to not only teach skills, but to enhance critical thinking and problem abilities of students. Although degree related credit courses in higher education should not be designed specifically to prepare students to master professional certification exams, this interest in professional certifications by the industry offers a unique opportunity for institutions of higher education to sponsor non-credit professional development workshops that prepare industry representatives for professional certification exams.

Many of the areas important to managers (marketing and consumer education skills, interpersonal skills, business skills, and general education) were not viewed as being particularly important for beginning technicians. Although the essential knowledge areas identified in this study provide excellent baseline information which can be utilized in the curriculum development and review processes, the authors believe that some degree of caution should be used in an effort not to overgeneralize the findings. Readers need to keep in mind that the study results were averaged without regard to type of business or location in the state. The accuracy of these findings would certainly be enhanced if small focus groups of industry representatives were used in validating the findings.

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PERCEPTIONS REGARDING PLANNING ACTIVITIES AND SUPERVISION STRATEGIES FOR SUPERVISED AGRICULTURAL EXPERIENCE PROGRAMS

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PERCEPTIONS REGARDING PLANNING ACTIVITIES AND SUPERVISION STRATEGIES FOR SUPERVISED AGRICULTURAL EXPERIENCE PROGRAMS

INTRODUCTION AND THEORETICAL FRAMEWORK

Supervised agricultural experience (SAE) programs have always been important in agricultural education. Supervised agricultural experience programs allow agricultural education students to learn by doing whereby they apply agricultural knowledge and skills learned in the classroom and laboratory in an "away from the classroom setting" (Experiencing Agriculture, 1992). Supervised experience programs "bridge the gap" between classrooms and work places by providing students opportunities for application and transfer (Phipps and Osborne, 1988).

For supervised agricultural experience programs to be successful, they must be properly planned and adequately supervised. Good planning helps insure at least a moderate amount of success by students (Binkley and Byers, 1984). Proper planning may help students avoid costly mistakes, save time and materials, have good results instead of poor results, and allow students to experience success rather than failure (Binkley and Byers, 1984).

The potential for successful supervised agricultural experience programs reside with agricultural education teachers. Agricultural education teachers play critical roles in promoting and managing successful student experiences (Experiencing Agriculture, 1992). Agricultural education teachers have the responsibility for guiding students in selecting, planning, and developing appropriate supervised agricultural experience programs as well as supervising students on a regular basis (Experiencing Agriculture, 1992).

To assist students in planning their supervised agricultural experience programs, agricultural education teachers need to provide systematic instruction throughout the school year (Experiencing Agriculture, 1992). It is also helpful to consider the needs and interests of students, needs of the agricultural industry, and availability of resources when helping students plan their supervised agricultural experience programs (Experiencing Agriculture, 1992).

Probably the greatest responsibility agricultural education teachers must perform with supervised agricultural experience programs is that of supervision. McCracken (cited in Harris, 1983) commented that the success or failure of supervised occupational experience programs for students, depends, to a large degree, upon the effectiveness of supervision by the teacher. While supervision is to provide individual instruction to students, it can also develop essential cooperative relationships with employers and parents/guardians (Experiencing Agriculture, 1992). Watkins (cited in Barrick, Hughes, and Baker, 1991) reported that the majority of agricultural employers in her study believed that students benefitted by teacher visits to the work site. Harris (1983), Gibson (1987) and Anyadoh (1989) all reported positive relationships between the number of supervisory visits and quality of supervised experience programs. Without supervision, supervised experience programs would be like schools without teachers (McMillion and Auville, 1976).

Various researchers have concluded that proper supervision and adequate supervision must occur for supervised agricultural experience programs to be successful. Osborne (1988) concluded that teacher involvement in planning and supervision was linked to the nature of supervised programs and student backgrounds. Students from farms with traditional programs were more likely to receive needed assistance. Osborne (1988) also concluded that teachers on extended contracts were more heavily involved in planning and supervision strategies. Herren and Cole (1984) found that teachers should have at least one period for SOEP supervision, teachers should maintain accurate records on mileage, student progress, and recommendations, and that the teacher is the only person who can do an effective job of SOEP supervision. Beeman (cited in Barrick, Hughes, and Baker, 1991) reported that more than one-half of school administrators disagreed with releasing agriculture teachers from school duties to make supervisory visits.

Lindsey (cited in Barrick, Hughes, and Baker, 1991) reported that with an increased number of limited opportunity students enrolling in agricultural education and with fewer farm students enrolling in courses, teachers will have to devote extra effort and time to ensure that students plan successful supervised experience programs. Agricultural education teachers will have to try harder to make sure students enrolled in specialized courses receive instruction pertaining to supervised agricultural experience programs, that appropriate programs are planned, and that all students are supervised.

PURPOSES AND OBJECTIVES

The purpose of the study was to describe the perceptions of Tennessee agricultural education teachers regarding planning activities and supervision strategies used with supervised agricultural experience programs. Furthermore, the study sought to describe relationships between teachers' perceptions regarding planning activities and supervision strategies and selected teacher demographics. Specific objectives of the study were to:

(1) Describe the perceptions of Tennessee agricultural education teachers regarding planning activities for supervised agricultural experience programs

(2) Describe the perceptions of Tennessee agricultural education teachers regarding supervision strategies used with supervised agricultural experience programs

(3) Discuss the relationships between teachers' perceptions regarding planning activities and supervision strategies used with supervised agricultural experience programs and selected teacher demographics

METHODS AND PROCEDURES

Population and Sample

The population for the descriptive-correlational study was all Tennessee agricultural education teachers who had taught at least one year at the beginning of the 1993-1994 school year (N=225). An up-to-date list of names was obtained from the Tennessee State Department of Education, Vocational Education Department, to serve as the sampling frame. Using a random sampling procedure, a sample of 150 teachers were selected to be included in the study. A confidence level of 95 percent was also established.

Instrumentation

Data were collected using a mailed questionnaire containing four parts. Only data from the last two parts are reported in this study. Part III assessed agricultural education teachers' perceptions regarding planning activities for supervised agricultural experience programs and part IV assessed agricultural education teachers' perceptions regarding supervision strategies used with supervised agricultural experience programs. A four-point Likert-type scale was used to assess agricultural education teachers' perceptions on both parts. A panel of experts, consisting of agricultural education teachers not selected as part of the sample, provided feedback on the instrument and determined the instrument had content validity. Cronbach's Alpha coefficients of .87 for the 10 item Likert-type scale on planning activities and .80 for the 15 item Likert-type scale for supervision strategies were calculated during a preliminary pilot test.

After two follow-up mailings, the final response rate was 71.3 percent. An analysis of early and late respondents failed to reproduce evidence of any substantial differences between the two groups. Therefore, findings from this study are assumed to be generalizable to the population from which it was drawn (Miller and Smith, 1983).

Analysis of Data

Descriptive statistics were used to summarize data. A series of t-tests were used to describe relationships between nominally-scaled independent variables and the intervally-scaled dependent variables, overall perception regarding planning strategies and supervision strategies. Pearson correlation coefficients were used to describe the magnitude of relationships between intervally-scaled independent variables and intervally-scaled dependent variables. Davis' (1971) convention was used to interpret these relationships. An alpha level of .05 was set a priori.

RESULTS

Objective One

Agricultural education teachers responded to a set of 10 Likert-type statements to describe their perceptions regarding planning activities for supervised agricultural experience programs. Table 1 reports the perceptions of agricultural education teachers regarding planning activities for supervised agricultural experience programs. The scale of measurement ranged from 1 = strongly disagree to 4 = strongly agree. Mean scores ranged from 2.70 to 3.34. The highest rated statement was "Agricultural education teachers should help students plan and carry out worthwhile supervised agricultural experience programs" (M = 3.34, SD = .53). The lowest rated statement was "New students enrolling in agricultural education should be visited before the school year begins" (M = 2.70, SD = .70).

Objective Two

Agricultural education teachers responded to a set of 15 Likert-type statements to describe their perceptions regarding supervision strategies used with supervised agricultural experience programs. The scale of measurement ranged from 1 = strongly disagree to 4 = strongly agree. Table 2 reports the perceptions of agricultural education teachers regarding supervision strategies used with supervised agricultural experience programs. Mean scores ranged from 1.85 to 3.59. The highest rated statement was "Agricultural education teachers should supervise students' supervised agricultural experience programs during the summer months as part of their extended contracts (M = 3.59, SD = .49). The lowest rated statement was "Students and their supervised agricultural experience programs should be visited only during the summer" (M = 1.85, SD = .45).

Objective Three

A series of t-tests were used to analyze differences in means when teachers were grouped by demographic variables. Demographic variables used in the analysis were the following: a) number of teachers in department; b) whether or not teachers taught semester courses in agricultural education; c) membership in various professional organizations; d) whether or not teachers subscribed to The Agricultural Education Magazine; e) whether or not teachers attended ag teacher conferences; f) length of teaching contract; g) whether or not teachers were enrolled in agricultural education courses while high school students; h) whether or not teachers conducted supervised experience programs while in high school; i) whether or not these teachers supervised experience programs were graded while high school students; j) whether or not teachers currently grade their students'

Table 1

Agricultural Education Teacher Perceptions Regarding Planning Activities For Supervised Agricultural Experience Programs

Statement Regarding Planning Activities for Supervised Agricultural Experience Programs	Mean	S.D.
Agricultural education instructors should help students plan and carry out worthwhile supervised agricultural experience programs.	3.34	.53
Parents should be involved in helping plan their child's supervised agricultural experience program.	3.23	.51
Students should have written plans for conducting their supervised agricultural experience programs.	3.20	.52
Real problems encountered by students in their supervised agricultural experience programs should be used as topics for classroom instruction.	3.20	.44
Class time should be used to update record books.	3.05	.62
Class time should be used for individual supervised agricultural experience planning.	3.03	.62
Orientation programs on supervised agricultural experience should be presented to students and their parents at the beginning of the school year.	3.01	.51
Schools should provide adequate facilities and resources for students to use to complete supervised agricultural experience programs if students lack the appropriate resources at home and/or farm.	3.01	.77
Students' supervised agricultural experience programs should be planned to meet their career objectives.	2.97	.52
New students enrolling in agricultural education should be visited before the school year begins.	2.70	.70

supervised agricultural experience programs; and k) whether or not teachers have a class period during the day to leave and supervise students.

Teachers who taught in multiple teacher departments had a more positive perception regarding planning activities for supervised agricultural experience programs than those who taught in single teacher departments (t = -2.34, p = .021). Teachers who subscribed to The Agricultural Education Magazine had a more positive perception regarding planning activities for supervised agricultural experience programs than those who did not (t = 2.56, p = .012). Teachers who counted their students' supervised agricultural experience programs as part of their grade in agricultural education had a more positive perception regarding planning activities for supervised agricultural than those who did not (t = 2.46, p = .016).

Teachers who were not enrolled in agricultural education courses while high school students had a more positive perception regarding supervision strategies used with supervised agricultural experience programs than those who did take agricultural education courses (t = -2.02, p = .046). Teachers who counted their students' supervised agricultural experience programs as part of their grade in agricultural education had a more positive perception regarding supervision strategies used with supervised agricultural experience programs than those who did not (t = 2.36, p = .020). Teachers who had a class period during the school day to leave and supervise students' supervised agricultural experience programs had a more positive perception regarding supervision strategies used with supervised agricultural experience programs than those who did not (t = 2.62, p = .010)

Pearson correlation coefficients were calculated to describe the direction and magnitude of relationships between intervally-scaled independent variables and teachers' overall perception regarding planning activities and supervision strategies. Table 3 reports these relationships. A moderate, positive, linear relationship existed between teachers' overall perception regarding planning activities and total number of days spent teaching first year students about supervised agricultural experience programs (r = .38). A moderate, positive, linear relationship existed between teachers' overall perception regarding planning activities and total number of days spent teaching other agricultural education students about supervised agricultural experience programs (r = .30). There was a moderate, positive, linear relationship between teachers' overall perception regarding planning activities and total number of days spent during the school year and summer months supervising students' supervised agricultural experience programs (r = .34). A moderate, positive, linear relationship existed between teachers' overall perception regarding supervision strategies and total number of days spent during the school year and summer months supervising students' supervised agricultural experience programs (r = .30). All other relationships were low to negligible.

Table 2

Agricultural Education Teacher Perceptions Regarding Supervision Strategies Used With Supervised Agricultural Experience Programs

Statement Regarding Supervision Strategies Used With Supervised Agricultural Experience Programs	Mean	S.D.
Agricultural education teachers should supervise students' supervised agricultural experience programs during the summer months as part of their extended contracts.	3.59	.49
Supervised agricultural experience programs must be supervised during the summer months as well as during the school year.	3.48	.45
Teachers should conduct on-site supervisory visits at students' homes, farms, and workplaces.	3.34	.51
For supervision to be effective, teachers need to make on-site supervisory visits.	3.32	.59
Supervision should be used as a teaching/learning opportunity.	3.31	.46
Supervision should motivate students to carry on successful supervised agricultural experience programs.	3.29	.46
Students should receive supervisory visits when they encounter problems with their supervised agricultural experience programs.	3.29	.51
Teachers should talk with parents on supervisory visits.	3.29	.50
Teachers should keep written records of students' supervisory visits.	3.29	.60
Students' supervised agricultural experience programs should be evaluated on a regular basis.	3.21	.47
School administrators should be supportive of time off during the school day for teachers to make supervisory visits.	3.16	.73
Teachers should inform students of their plan for supervised agricultural experience visits ahead of time.	3.11	.59
Students should be visited as least once per semester.	2.90	.64
Students should be visited during each grading period.	2.22	.69
Students and their supervised agricultural experience programs should be visited **only** during the summer.	1.85	.45

Table 3

Relationships Between Intervally-Scaled Demographic Variables and Teachers' Perceptions Regarding Planning Activities and Supervision Strategies For Supervised Agricultural Experience Programs

Variable	Planning	Supervision
Number of Years Teaching Agricultural Education	.04	.13
Age	.08	.18
Total Number of Students Enrolled in Agricultural Education Program Last Year	.27*	.19
Total Number of Students in Program Last Year Conducting Supervised Agricultural Experience Programs	.27*	.16
Total Number of Days Spent Teaching First Year Students About Supervised Agricultural Experience Programs	.38*	.28*
Total Number of Days Spent Teaching Other Students About Supervised Agricultural Experience Programs	.30	.29*
Total Number of Days Spent During School Year and Summer Months Supervising Students' Supervised Agricultural Experience Programs	.34	.30*
Total Amount of Training Teachers Has Received About Supervised Agricultural Experience Programs	.19*	.10

* $p < .05$

CONCLUSIONS AND/OR RECOMMENDATIONS

Based on the findings of the study, the following conclusions were determined and recommendations offered.

1) Agricultural education teachers in Tennessee have relatively positive perceptions regarding planning activities and supervision strategies used with supervised agricultural experience programs. They agree that they should be involved in helping students plan their supervised agricultural experience programs and that they should supervise students' supervised agricultural experience programs during the summer as part of their extended contract.

2) Agricultural education teachers teaching in multiple teacher departments had a more positive perception regarding planning

activities for supervised agricultural experience programs than those who taught in single teacher departments. Teachers in multiple teachers departments can maintain workable student-teacher ratios to promote the continuation of active supervised agricultural experience programs (Boone, Elliot, and Doerfert, 1988). If economically feasible, local school systems with agricultural education programs should consider having multiple teacher agricultural education departments. Research should be conducted to describe and discuss the benefits of having multiple teacher departments.

3) Agricultural education teachers subscribing to The Agricultural Education Magazine had a more positive perception regarding planning activities for supervised agricultural experience programs than those who did not. While the research findings show this, subscribing to The Agricultural Education Magazine may not influence their perception of supervised agricultural experience programs. Teacher may just be supporting on part of professional development in agricultural education.

4) Agricultural education teachers counting their students' supervised agricultural experience programs as part of their grade in agricultural education had a more positive perception regarding planning activities and supervision strategies used with supervised agricultural experience programs. Additional research should be conducted to determine if there are any benefits of counting supervised agricultural experience programs as part of students' grade in agricultural education.

5) Agricultural education teachers who did not enroll in agricultural education courses while high school students had a more positive perception regarding supervision strategies used with supervised agricultural experience programs than those who did. Why did those teachers who were enrolled in agricultural education courses while high school students not have a more positive perception? Did they not conduct a supervised program in agriculture? Where they never supervised by their teachers? Did they receive poor supervision when their teacher did visit them? Research should be conducted to see what the reasons are.

6) Agricultural education teachers having a class period during the school day to leave and supervise students' supervised agricultural experience programs has a more positive perception regarding supervision strategies used with supervised agricultural experience programs than those who did not. However, only 20 percent of agricultural education teachers have such a period for supervision

(Osborne, 1988; Swortzel, 1994). Additional research needs to be conducted to determine the benefits of having such a period during the school day for supervision.

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PERCEPTIONS OF TENNESSEE AGRICULTURAL EDUCATION TEACHERS REGARDING THE IMPORTANCE OF SUPERVISED AGRICULTURAL EXPERIENCE PROGRAMS

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INTRODUCTION AND THEORETICAL FRAMEWORK

Supervised agricultural experience programs have long been an essential component of the total agricultural education program. When Rufus Stimson was director of an agricultural school in Massachusetts, he required his students to have supervised programs that focused on home farming problems and their solutions (Boone, Doerfert, and Elliot, 1987). The Smith-Hughes Act of 1917 required all students enrolled in vocational agriculture classes to have directed supervised practices in agriculture in order to prepare them to become farmers (Phipps and Osborne, 1988). The Vocational Education Act of 1963 contained language that allowed students to conduct supervised occupational experience programs in order to prepare them for new occupations in agriculture in the areas of processing, marketing, and distribution.

Historically, supervised experiences were created to provide agriculture students with excellent preparatory opportunities for eventual occupations in the agricultural industry (Experiencing Agriculture, 1992). Today, agricultural education emphasizes fundamental and transferable (less job specific) agricultural knowledge. The definition of supervised agricultural experience has been expanded to include exploratory experiences to provide students better understanding of agricultural principles and practices that may not result in paid occupational experiences (Experiencing Agriculture, 1992). In 1988, the National Research Committee on Agricultural Education in Secondary Schools reported on and recognized the importance of supervised experience and emphasized that supervised agricultural experience programs should include land laboratories, agricultural mechanics laboratories, school greenhouses, nurseries, and other facilities (Barrick, Hughes, and Baker, 1991).

Supervised agricultural experience programs should be based in the belief that the most effective learning is learning by doing (Experiencing Agriculture, 1992). Learning by doing provides experiences centered upon the application of classroom concepts. The act of doing promotes more thorough understanding and retention in students than does only reading and listening (Experiencing Agriculture, 1992). When planning such experiences, they should consist of individualized learning activities and be based on students' interests and goals.

In 1992, The National Task Force for Supervised Agricultural Experience still recognized the importance of having supervised experience programs. Not only did they continue to recognize the benefits for students, parents, teachers, and employers, they also recognized benefits for agricultural businesses and the community. Pals (1989) conducted a study to identify values and benefits of supervised experience programs. This study concluded that supervised experience programs benefit students, parents, teachers, and employers. Some benefits included "promotes acceptance of responsibility," "develops self confidence," and "provides opportunity to learn on own."

Numerous studies have been conducted to determine the perceptions of agricultural education teachers regarding the importance of supervised agricultural experience programs. Berkey and Sutphin (1983) determined that school administrators perceived that SOEP is more important for a quality vocational agriculture program than did agricultural education teachers. Herren and Cole (1984) determined that agricultural education teachers believed that students should have an SOEP, that SOEP's are instrumental in preparing students for jobs in agriculture,students should receive credit for SOEP's and SOEP's are instrumental in preparing students for jobs in agriculture. Osborne (1988) concluded that teachers are supportive of the SOE concept and believe most students can conduct worthwhile SOE programs. Students should be required to keep records and worthwhile SOE programs can be completed on school-owned or school-managed property. Barrick, Hughes, and Baker (1991) concluded that there us a positive relationship between school facilities being provided for supervised experiences and the quality of the supervised experience program.

PURPOSE AND OBJECTIVES

The purpose of the study was to describe the perceptions of Tennessee agricultural education teachers regarding the importance of supervised agricultural experience programs. Furthermore, the study sought to describe relationships between teachers' perceptions regarding the importance of supervised agricultural experience programs and selected teacher demographics. Specific objectives of the study were to:

(1) Describe the demographic characteristics of Tennessee agricultural education teachers

(2) Describe the perceptions of Tennessee agricultural education teachers regarding the importance of supervised agricultural experience programs

(3) Discuss the relationships between teachers' perceptions regarding the importance of supervised agricultural experience programs and selected teacher demographics

METHODS AND PROCEDURES

Population and Sample

The population for the descriptive-correlational study was all Tennessee agricultural education teachers who had taught agricultural education at least one year at the beginning of the 1993-1994 school year (N=225). An up-to-date list of names was obtained from the Tennessee State Department of Education, Vocational Education Department, to serve as the sampling frame. Using a random sampling procedure, a sample of 150 teachers were selected to be included in the study. A confidence level of 95 percent was established.

Instrumentation

Data were collected using a mailed questionnaire containing four parts. Only data from the first two parts are reported in this study, Part I collected agricultural education teacher demographic data and part II assessed agricultural education teachers' perceptions regarding the importance of supervised agricultural experience programs using a four-point Likert-type scale. A panel of experts, consisting of agricultural education teachers not selected as part of the sample, provided feedback on the instrument and determined the instrument had content validity. A Cronbach's Alpha coefficient of .93 was calculated for the 20 item Likert-type scale during the preliminary pilot test.

After two follow-up mailings, the final response rate was 71.3 percent. An analysis of early and last respondents failed to produce evidences of any substantial differences between the two groups. Therefore, findings from this study are assumed to be generalizable to the population from which it was drawn (Miller and Smith, 1983).

Analysis of Data

Descriptive statistics were used to summarize data. A series of t-tests were used to describe relationships between nominally-scaled independent variables and the intervally-scaled dependent variable, agricultural education teachers' overall perception regarding the importance of supervised agricultural experience programs. Pearson correlation coefficients were used to describe the direction and magnitude of relationships between intervally-scaled independent variables and the intervally-scaled dependent variable. Davis' (1971) convention was used to interpret these relationships. An alpha level of .05 was set a priori.

RESULTS AND FINDINGS

Objective One

Approximately 59 percent of agricultural education teachers in Tennessee taught in single teacher agricultural education departments. The same percentage of teachers also taught specialized semester courses in agricultural education. The average agricultural education program in Tennessee had 124 students enrolled in agricultural education courses with 73 students per program conducting supervised agricultural experience programs.

Approximately 79 percent of teachers enrolled in agricultural education courses while they were high school students. Three out of every four agricultural education teacher conducted supervised experience programs in agriculture while they were in high school. Over one-half (55 percent) of agricultural education teachers said that their supervised experience programs were graded and counted as part of their final grade in agricultural education. Approximately 64 percent of agricultural education teachers today grade their students' supervised agricultural experience programs and count them in their final grade in agricultural education courses.

Agricultural education teachers kept up-to-date about agricultural education and supervised agricultural experience programs through many different ways. Almost all of the teachers (97 percent) were members of the Tennessee Vocational Agriculture Teachers Association (TVATA). Seventy-two percent were members of the National Vocational Agriculture Teachers Association (NVATA). Approximately 92 percent attended this past summers agricultural education teachers summer conference. Only one-third of the teachers subscribed to The Agricultural Education Magazine.

The average agricultural education teacher in Tennessee was 41 years old with 15.55 years of teaching experience. Eighty-eight percent of the teachers were employed on a 12 month teaching contract. Only 21 percent of the teachers had a class period during the school day where they could leave and supervise students' supervised agricultural experience programs. Almost 93 percent had completed an undergraduate level college course on supervised agricultural experience programs while 67 percent had completed a graduate level course on supervised agricultural experience programs.

Objective Two

Agricultural education teachers responded to a set of 20 Likert-type statements to describe their perceptions regarding the importance of supervised agricultural experience programs. The scale of measurement ranged from 1 = strongly disagree to 4 = strongly agree. Table 1 reports the perceptions of agricultural education teachers regarding the importance of supervised agricultural experience programs. Mean scores ranged from 1.62 to 3.64. The highest rated statement was "Supervised agricultural experience programs should be based on the educational philosophy of learning by doing" (M = 3.64, SD = .48). The lowest rated statement was "Teaching lessons on supervised agricultural experience is a waste of time" (M = 1.62, SD = .59).

Objective Three

A series of t-tests were used to analyze differences in means when teachers were grouped by demographic variables. Demographic variables used in the analysis were the following: a) number of teachers in department; b) whether or not teachers

Table 1

Tennessee Agricultural Education Teacher Philosophies Regarding the Importance of Supervised Agricultural Experience Programs

Statement Regarding the Importance of Supervised Agricultural Experience Programs	Mean	S.D.
Supervised agricultural experience programs should be based on the educational philosophy of learning by doing.	3.64	.48
All students that conduct supervised agricultural experience programs should be encouraged to keep records on their program.	3.58	.50
Supervised agricultural experience should be a valuable component of agricultural education programs today.	3.45	.55
Supervised agricultural experience programs are an essential component of the total agricultural education program.	3.42	.65
Topics on supervised agricultural experience should be taught to prospective agricultural education teachers.	3.33	.51
Student teachers should supervise students' supervised agricultural experience programs while student teaching.	3.33	.51
An important aspect of supervised agricultural experience programs should be that they provide first hand occupational experience in agriculture.	3.28	.51
Opportunities for supervised agricultural experience should be discussed in every course offered in agricultural education.	3.28	.64
Supervised agricultural experience programs should be instrumental in preparing students for careers in agriculture.	3.23	.54
Supervised agricultural experience programs should be promoted in all agricultural education classes.	3.21	.56
Students should receive credit toward graduation for completing supervised agricultural experience programs.	3.15	.71
Supervised agricultural experience programs should relate to students' occupational goals.	3.14	.62

Table 1 (continued)

Statement Regarding the Importance of Supervised Agricultural Experience Programs	Mean	SD.
Supervised agricultural experience programs should have a lot to do with FFA degree advancement.	3.14	.71
If students lack adequate resources at home and/or farm, worthwhile supervised agricultural experience programs can be completed on school-owned or school-managed properties.	3.14	.61
All agricultural education students enrolled in semester agricultural education courses should be encouraged to conduct supervised agricultural experience programs.	3.13	.58
The present supervised agricultural experience concept is workable with today's agricultural education programs.	2.94	.70
Supervised agricultural experience programs make agricultural education programs vocational.	2.94	.68
Students' grades in agricultural education should be based partly on their supervised agricultural experience programs.	2.84	.70
Good supervised agricultural experience programs can be conducted by all students enrolled in agricultural education.	2.48	.74
Teaching lessons on supervised agricultural experience is a waste of time.	1.62	.59

taught semester courses in agricultural education; c) membership in various professional organizations; d) whether or not teachers subscribed to The Agricultural Education Magazine; e) whether or not teachers attended ag teacher conferences; f) length of teaching contract; g) whether or not teachers were enrolled in agricultural education courses while high school students; h) whether or not teachers conducted supervised experience programs while in high school; i) whether or not these teachers supervised experience programs were graded while high school students; j) whether or not teachers currently grade their students' supervised agricultural experience programs; and k) whether or not teachers have a class period during the day to leave and supervise students.

Agricultural education teachers who taught in multiple teacher departments had a more positive perception regarding the importance of supervised agricultural experience programs than those who taught in single teacher departments (t = -2.15, p = .034). Agricultural education teachers who subscribed to The Agricultural Education Magazine had a more positive perception regarding the importance of supervised agricultural experience programs than those who did not (t = 2.97, p = .004). Agricultural education teachers who counted their students' supervised agricultural experience programs as part of their grade in agricultural education had a more positive perception regarding the importance of supervised agricultural experience programs than those who did not (t = 4.00, p < .001). Agricultural education teachers who had a class period during the school day to leave and supervise students' supervised agricultural experience programs had a more positive perception regarding the importance of supervised agricultural experience programs than those who did not (t = 2.35, p = .021).

Table 2 reports the direction and magnitude of relationships between intervally-scaled independent variables and teachers' overall perception regarding the importance of supervised agricultural experience programs. A moderate, positive, linear relationship existed between teachers' overall perception regarding the importance of supervised agricultural experience programs and total number of students conducting supervised agricultural experience programs last school year (r = .38). All other relationships were low to negligible.

Table 2

Relationships Between Intervally-Scaled Demographic Variables and Teachers Perception Regarding the Importance of Supervised Agricultural Experience Programs

Variable	Importance
Number of Years Teaching Agricultural Education	.10
Age	.09
Total Number of Students Enrolled in Agricultural Education Program Last Year	.18
Total Number of Students in Program Last Year Conducting Supervised Agricultural Experience Programs	.38*
Total Number of Days Spent Teaching First Year Students About Supervised Agricultural Experience Programs	.26*
Total Number of Days Spent Teaching Other Students About Supervised Agricultural Experience Programs	.21*
Total Number of Days Spent During School Year and Summer Months Supervising Students' Supervised Agricultural Experience Programs	.25*
Total Amount of Training Teachers Has Received About Supervised Agricultural Experience Programs	.25*

*p < .05

CONCLUSIONS AND/OR RECOMMENDATIONS

Based on the findings from the data, the following conclusions were formulated and recommendations offered.

1) Agricultural education teachers in Tennessee had a relatively positive overall perception regarding the importance of supervised agricultural experience programs. Supervised agricultural experience programs should be based on the educational philosophy of learning by doing. Supervised agricultural experience programs are also a valuable component of the agricultural education program and that supervised agricultural experience programs should be promoted in all agricultural education courses.

2) Agricultural education teachers who taught in multiple teacher departments had a more positive overall total philosophy regarding the importance of supervised agricultural experience programs. Agricultural education teachers in multiple teacher departments will place a higher value on supervised experience than those teachers who work in single teacher departments (Barrick, Hughes, and Baker, 1991). If economically feasible, local school systems with agricultural education programs should consider having multiple teacher agricultural education departments. Research should be conducted to describe and discuss the benefits of having multiple teacher departments.

3) Agricultural education teachers who subscribed to The Agricultural Education Magazine had a more positive philosophy toward the importance of supervised agricultural experience programs. While the research findings show this, subscribing to The Agricultural Education Magazine may not influence their perception of supervised agricultural experience programs. Teachers may just be supporting on part of professional development in agricultural education.

4) Agricultural education teachers counting their students' supervised agricultural experience programs as part of their grade in agricultural education had a more positive philosophy toward the importance of supervised agricultural experience programs. Additional research should be conducted to determine if there are any benefits of counting supervised agricultural experience programs as part of students' grade in agricultural education.

5) Agricultural education teachers having a class period during the school day to leave and supervise students' supervised agricultural experience programs has a more positive overall philosophy regarding the importance of supervised agricultural experience programs. However,

only 20 percent of agricultural education teachers have such a period for supervision (Osborne, 1988; Swortzel, 1994). Additional research needs to be conducted to determine the benefits of having such a period during the school day for supervision.

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PERCEPTIONS OF NORTH CAROLINA SECONDARY SCHOOL PRINCIPALS CONCERNING VOCATIONAL EDUCATION PROGRAMS IN AGRICULTURAL EDUCATION

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PERCEPTIONS OF NORTH CAROLINA SECONDARY SCHOOL PRINCIPALS CONCERNING VOCATIONAL EDUCATION PROGRAMS IN AGRICULTURAL EDUCATION

INTRODUCTION AND THEORETICAL FRAMEWORK

Since school administrators have authority and influence in programs and curricula at the school and school system levels, changes in vocational education will require their approval and support. Thompson (1986) reported in an Arkansas study that administrators' opinions are very important, since administrators' decisions often drastically affect program operations and directions. An example of administrators' influence was found in a study of Kansas school districts that did not have agricultural education programs (Parmley, 1982). The study concluded that rural residents and agribusiness representatives wanted programs in agriculture. However, when the administrators did not want the programs they cited a lack of student interest, inadequate facilities, inadequate funding, and the lack of a need for agricultural education as reasons for not implementing the programs (Parmley, 1982). A 1979 national study found that a significant number of school administrators did not support programs providing high school students opportunities to develop salable job skills through vocational programs. These same administrators will determine whether or not vocational education is available in the secondary schools (United States Department of Education, 1979).

The National Research Council (1988) found that agricultural education programs were essentially existing in isolation and that they were not a part of the communities and businesses in which the schools existed. The Council recommended that formal and informal cooperative efforts between schools and their communities become a top priority for agricultural education programs. However, the United States Department of Education (1979) reported that public support for vocational education programs continued to be strong. Jewell (1987) also reported that administrators in North Carolina perceived that a majority of the people in their communities regarded agricultural education as an important and essential part of a high school education.

In a study involving Arizona administrators, principals listed teaching technical agriculture and agriculture mechanics as the most important responsibility of agricultural education teachers (Cox, 1986). North Carolina administrators indicated that students who enrolled in agricultural education courses for four years received an adequate high school education, although the percentage of the administrators indicating those beliefs decreased between 1978 and 1986 (Jewell, 1987). According to Jewell (1987), principals believed that the programs should be general in nature and should provide a general knowledge of agriculture. Warmbrod and Bobbitt (1987) recommended that the introductory course in agricultural education be general in nature, followed by courses in succeeding years that increase in specificity. Administrators in an Indiana study also believed that vocational education should be a part of the education of all pupils. They also indicated that vocational education at the secondary level should be specific, not broad and general (Nasstrom and Baker, 1979). The National Research Council concluded in a 1988 study that systematic instruction about agriculture should begin in kindergarten and continue through the twelfth grade to help Americans become agriculturally literate. Jewell (1987) also recommended that consideration be given to increasing the number of general and/or introductory agriculture courses and that this recommendation might be accomplished by expanding agricultural offerings to the middle and elementary schools. Frantz et al. (1988) recommended that polices should be established at the local and state levels to protect the comprehensiveness of schools and student access to vocational education programs.

Administrators are the instructional leaders in their schools and/or school systems, and their leadership in curriculum and instructional reforms are important. Administrators with negative attitudes toward vocational education and/or reform recommendations will probably not be successful in implementing these initiatives in their schools or school systems. This study provides vocational educators with information that can be analyzed to overcome or improve situations that could have a negative effect on agricultural education. Strategies may also be developed to enhance agricultural education programs so they can continue to be important and viable components of public education.

PURPOSE AND OBJECTIVES

The purpose of the study was to determine building-level administrators' attitudes toward vocational programs in agricultural education at their schools. More specifically, the objective of this study was to determine the attitudes of North Carolina secondary school principals concerning issues related to their agricultural education programs.

RESEARCH METHODS AND PROCEDURES

Population

The population for the study included the building-level administrators (principals) in North Carolina who had agricultural education as a part of their school curricular offerings during the 1992-93 academic year. The population was selected by first identifying the schools that offered agricultural education ($\underline{N} = 244$), and then identifying the principals of those schools. A random sample ($\underline{n} = 150$) was drawn from this population, utilizing a computer generated random selection process.

Instrumentation

The data collection instrument for the study was researcher developed and addressed the administrators' attitudes toward agricultural education course offerings and programs. Content validity was assessed by a committee of experts, consisting of agricultural education consultants from the North Carolina Department of Public Education and teacher educators at North Carolina State University. The instrument was field tested to determine clarity. The same sample of school administrators selected for the field test was used to determine the reliability of the research instrument, using a test-retest reliability procedure. The coefficient of stability was found to be .94 for the instrument.

Data Collection

The instrument, along with a cover letter, was mailed on June 10, 1993. The members of the sample were asked to return the completed survey by June 30, 1993. The vocational directors from the local education agencies who had principals selected in the research sample were also sent a letter on June 10, 1993. They were asked to contact their principals and urge them to complete and return the survey instruments they had received. A follow-up mailing was sent to those members of the sample who failed to respond to the first mailing on June 30, 1993. Those persons receiving a follow-up mailing were asked to return the completed survey by July 9, 1993. The surveys returned by the late respondents (follow-up mailing) were kept separate from those received after the first mailing.

A total of 112 responses was received from the after the first mailing, and 20 additional responses were received from the non-responding after receiving the follow-up mailing. Responses received from the follow-up mailing were statistically compared on all variables with the initial responses using Hotelling-Lawley Trace statistics. Hotelling-Lawley Trace statistic is the appropriate multivariate analysis of variance (MANOVA) when using two independent samples. No significant differences were found ($\underline{F} = 0.543$, $\underline{p} = 0.4641$). According to Miller and Smith (1983), late responses have been found to be very similar to non respondents. Therefore, since no statistically significant differences between early and late respondents were found, the data sets were combined for statistical purposes. They were also assumed to be representative of the population of principals who had agricultural education programs at their schools during the 1992-93 academic year. The combined total usable response from the sample was 132 or 88%.

ANALYSIS OF DATA

The data for this study were analyzed by descriptive statistical procedures. Descriptive statistics were utilized for all items in the study, and frequencies, means, standard deviations, and percentages were reported. Descriptive statistics were used to answer the research objective.

RESULTS AND/OR FINDINGS

Demographic Information of the Principals

The principals of the agricultural education programs ranged from 32 to 62 years of age and averaged 47.46 years. The administrators' tenure as principals ranged from one to 28 years, with a mean of 10.42 years. Approximately 42% (n = 54) of the administrators took at least one agricultural education course in high school and 18.95% (n = 25) of those taking agricultural courses received four or more credits in agricultural education. Sixty-five percent (n = 84) of the administrators took at least one vocational education course other than agricultural education during high school. Administrators who have been vocational education teachers in areas other than agriculture accounted for 7.58% (n = 10) of the sample, and 7.58% (n = 10) of the principals were former agricultural education teachers. An average of 3.04 visits to student SAE programs were made during the 1992-1993 academic year by the respondents. Fourteen percent (n = 18) of the administrators have attended at least one State FFA Convention, and 3.04% (n = 2) have attended at least one National FFA Convention during the period from 1987-1992. Eighty percent (n = 97) of the principals indicated they would attend state and national FFA conventions and participate in SAE visits if they were invited by their agricultural education teachers to do so. Approximately 74% (n = 98) of the principals classified their schools as being in a rural setting. However, approximately 30% (n = 38) indicated that 1000 or more students were enrolled at their schools.

Attitudes of Building-Level Administrators Concerning Agricultural Education Programs and Course Offerings

The administrators were asked to rate each of the statements on the data collection instrument according to the following scale: 1 = Strongly Disagree (Respondent disagreed with the statement without exception); 2 = Disagree (Respondent disagreed with the statement, but was not 100% opposed to the statement); 3 = Slightly Disagree (Respondent disagreed with some elements of the statement, but not the whole statement); 4 = Slightly Agree (Respondent agreed with some elements of the statement, but not the whole statement); 5 = Agree (Respondent agreed with the statement, but not 100% supportive of the statement); or 6 = Strongly Agree (Respondent agreed with the statement without exception). However, for practical interpretation of the data, the mid-points between defined intervals were used. For example, an average rating of 3.50 to 4.49 was interpreted as slightly agree.

The research objective was addressed by categorizing 64 statements, used to obtain the attitudinal data, into seven categories: Curriculum Issues; Program Accountability Issues; Descriptive Program Issues; Program Image; Academic Integration; Vocational Student Organization (FFA); and Teacher Performance. Descriptive statistics, means, standard deviations, and frequencies were used to describe the attitudes registered by the principals for each of the statements.

Table 1 contains mean ratings of the attitudes of the principals toward statements designed to address agricultural education curriculum issues. The principals indicated that horticulture courses were the most appropriate agriculture courses to be included in a contemporary high school curriculum. However, they felt that all the agricultural education course currently being offered in the public schools of North Carolina were appropriate for a contemporary high school curriculum. They also indicated that agricultural education courses should be taught by certified agricultural education teachers. However, they

Table 1

Attitudes of Secondary School Principals Toward Agricultural Education Curriculum Issues

Statement	n	M[a]	SD
The agricultural education curriculum should provide students with occupational specific skills which are needed to obtain jobs or to pursue further training at the post-secondary level.	130	5.22	0.93
Academic and agricultural education curricula should be integrated so students will be provided fundamental academic skills that are enhanced in agricultural education courses.	132	5.18	1.12
The following types of agricultural education course offerings should be included in a contemporary high school curriculum:			
Horticulture	130	5.09	0.74
Resources Management	130	4.99	0.98
Introduction to Agriscience	128	4.89	1.01
Agricultural Engineering Technology (Agricultural Mechanics)	130	4.81	1.10
Specialty Courses (i.e. aquaculture, small animal care, biotechnology, floral design, applied zoology, horse management, swine management, poultry management)	130	4.75	1.04
Agricultural Production and Management	130	4.68	1.20
Agricultural Cooperative Training	127	4.35	1.41
Agricultural education courses, such as horticulture or aquaculture, should be taught by certified agricultural education teachers.	132	5.08	1.08
The articulation of agricultural education training between secondary and post-secondary institutions should be increased.	132	5.05	0.77
Agricultural education programs should be fully articulated with community college programs through TECH-PREP agreements.	132	5.00	1.11
A substantial amount of international agriculture should be infused into the high school agricultural education curriculum.	128	4.59	0.87
Students should enroll in programs requiring work experience, such as Agricultural Cooperative, while attending high school.	132	3.56	1.42
All students should complete at least one agricultural course in order to meet graduation requirements.	130	2.68	1.62
Agricultural education courses should be moved from high schools to community colleges.	132	2.33	1.08

a. Means were based on responses to a six-point scale where 1=Strongly Disagree, 2=Disagree, 3=Slightly Disagree, 4=Slightly Agree, 5=Agree, and 6=Strongly Agree

slightly disagreed with the recommendation of requiring all students to complete at least one agriculture course in order to meet graduation requirements.

The principals reported they agreed that agricultural education programs should be fully articulated with community college programs through a TECH-PREP agreement. However, the principals disagreed with the statement "agricultural education courses should be moved from high schools to community colleges."

As reported in Table 2, principals agree that schools with agricultural education programs should have active advisory councils. They also indicated that one objective of agricultural education programs should be to prepare high school students for gainful employment in jobs related to agricultural and natural resources.

Table 2

Attitudes of Secondary School Principals Toward Agricultural Education Program Accountability Issues

Statement	n	M[a]	SD
One objective of agricultural education programs should be to prepare students for gainful employment in the fields of agriculture and natural resources.	130	4.76	1.21
Each school with a program in agricultural education should have an active advisory council.	130	4.62	1.25
Employment of graduates in jobs requiring skills acquired in agricultural courses should be increased for accountability.	130	4.57	1.24
When fully implemented, VoCATS (Vocational Competency Achievement Tracking System) will be a vehicle to effective assess vocational competence of agricultural education students.	132	4.48	1.04
The primary focus of secondary agricultural education should be occupational training.	130	3.92	0.99
School administrators should have an in-depth knowledge and understanding of agricultural education programs.	132	3.76	1.37
Agricultural education programs should consist of individual courses rather than multi-course, multi-year programs.	130	3.69	1.24
School administrators should be held accountable for the success of agricultural education students and consequently, agricultural education programs.	130	3.65	1.58
The rate of student placement in agricultural occupations should not be a major factor in continuation of agricultural programs.	130	3.38	1.33
Funds currently spent on agricultural education programs would be better spent on other vocational and/or academic programs.	130	2.46	1.16

a. Means were based on responses to a six-point scale where 1=Strongly Disagree, 2=Disagree, 3=Slightly Disagree, 4=Slightly Agree, 5=Agree, and 6=Strongly Agree

The principals only slightly agreed that the primary focus of secondary agricultural education programs should be for occupational training or that agricultural programs should consist of individual courses rather than multi-course, multi-year programs. The principals also indicated they only slightly agreed that VoCATS will be an effective means of assessing the vocational competence of students enrolled in agricultural education courses.

The administrators indicated they agreed that employment of high school graduates in jobs that use the skills acquired in high school agricultural courses should be increased for program accountability. However, they disagreed with the opinion that funds currently being spent on agricultural education programs would be better spent on other vocational and/or academic programs.

Table 3 presents the attitudes of the principals toward selected statements concerning descriptive issues about agricultural education programs. The principals disagreed with the statement that "only students who wish to pursue a career/job in agriculture should enroll in agricultural education courses." The principals also slightly disagreed with the statement that agricultural education teachers should have smaller teaching loads than other teachers because of extra duties with FFA, SAE, laboratory management, and adult education. The administrators slightly disagreed that provisions should be made so that agricultural education courses receive recognition to meet admission requirements for the University of North Carolina system. However, they agreed with the opinion that agricultural courses are appropriate for college bound students.

Table 3

Attitudes of Secondary School Principals Toward Descriptive Issues About Agricultural Education Programs

Statement	n	M[a]	SD
In setting the future course for agricultural education, educational leaders should consider employment opportunities in the service or business sectors related to agriculture.	130	5.05	0.79
Agricultural courses are appropriate for college bound students.	132	4.64	1.09
Provisions should be made so that agricultural education courses receive recognition to meet admission requirements for the University of North Carolina system.	132	3.35	1.68
Agricultural education teachers should have smaller teaching loads than other teachers because of extra duties with FFA, SAE, laboratory management, and adult education.	128	2.62	1.50
Only students who wish to pursue a career/job in agriculture should enroll in agricultural education courses.	130	2.49	1.28

a. Means were based on responses to a six-point scale where 1=Strongly Disagree, 2=Disagree, 3=Slightly Disagree, 4=Slightly Agree, 5=Agree, and 6=Strongly Agree

Table 4 displays the attitudes of the principals toward statements concerning the image of agricultural education programs. The administrators indicated they strongly disagreed with the statement that agricultural education was an exemplary model of the educational reform movement. However, they also disagreed with the statements, "agricultural education courses are not important components of the high school curriculum," "agricultural education is no longer needed in the public schools," "instruction in agriculture does not support or enhance the goals of general secondary education," and "the benefits students derive from agricultural education are no longer important."

The findings of this study indicated that the principals in North Carolina slightly agreed that the majority of the people in their school communities regarded agricultural education as an important part of the high school program. However, they slightly disagreed with the statement "agricultural courses should be credited toward satisfying high school graduation requirements for science courses."

Table 4

Attitudes of Secondary School Principals Concerning the Image of Agricultural Education Programs

Statement	n	M[a]	SD
Agricultural education provides motivation for students to continue their education beyond high school.	130	4.25	1.15
The majority of the people in my community regard agricultural education as an important part of the high school program.	130	3.89	1.21
Agricultural courses should be credited toward satisfying high school graduation requirements for science courses.	132	3.28	1.58
Students who enroll in agricultural education courses compromise their social status among students not enrolled in agricultural education courses.	128	2.80	1.38
The curriculum in agricultural education has kept pace with the changes in agricultural technology.	128	2.77	1.33
Instruction in agriculture does not support or enhance the goals of general secondary education.	130	2.45	1.13
Agricultural education is no longer needed in the public schools.	130	2.13	1.18
Agricultural education courses are not important components of the high school curriculum.	130	2.08	1.05
The benefits students derive from agricultural education are no longer important.	130	1.96	1.07
Agricultural education is an exemplary model of the educational reform movement.	132	1.00	0.00

a. Means were based on responses to a six-point scale where 1=Strongly Disagree, 2=Disagree, 3=Slightly Disagree, 4=Slightly Agree, 5=Agree, and 6=Strongly Agree

Based on the findings presented in Table 5, it appears that public school principals in North Carolina agree that agricultural education courses provide an effective vehicle for integrating academic and vocational education skills and they slightly agree that agricultural courses provide an effective vehicle for developing computer literacy competencies. They also agreed that ongoing efforts should be expanded to upgrade the scientific content of agricultural courses and that a substantial amount of applied science principles and concepts should be infused into the high school agricultural education curriculum.

Principals in North Carolina public schools appear to be supportive of the FFA component of their agricultural education programs as indicated by reviewing the findings displayed in Table 6. The principals disagreed with the statement, "vocational student organizations such as the FFA are outdated ideas whose time have passed," and agreed with the statement, "vocational student organizations, like FFA, should be part of every high school's co-curricular activities." Further, the principals indicated they slightly agreed with the statements, "all schools with agricultural education programs should have FFA chapters" and "the primary purpose of the FFA is to develop leadership among agricultural education students."

Table 5

Attitudes of Secondary School Principals Toward Statements Concerning Academic Integration in Agricultural Programs and Course Offerings

Statement	n	M^a	SD
A substantial amount of applied science should be infused into the high school agricultural education curricula.	130	5.15	0.75
Teacher education programs in agriculture should stress applied learning, but should also strengthen instruction in science, marketing and management, and international agriculture.	130	5.14	0.81
Ongoing efforts should be expanded and accelerated to upgrade the scientific content of agriculture courses.	130	5.04	0.84
Agricultural education courses provide an effective vehicle for the integration of academic and vocational education skills.	132	4.67	1.07
The agricultural education program needs to more effectively meet the needs of special population groups.	132	4.17	1.03
Agricultural education courses provide an effective vehicle for developing computer literacy competencies.	131	3.90	1.45
Agricultural education teachers should serve on committees for selecting math and science instructional materials and math and science teachers should serve on committees for selecting instructional materials for agriculture.	130	3.88	1.42
The emphasis of secondary school should be on developing basic academic skills; therefore, there should be less emphasis on the teaching of technical agriculture content/skill courses.	132	2.94	1.31

a. Means were based on responses to a six-point scale where 1=Strongly Disagree, 2=Disagree, 3=Slightly Disagree, 4=Slightly Agree, 5=Agree, and 6=Strongly Agree

Table 6

Attitudes of Secondary School Principals Toward the Vocational Student Organization (FFA) Component of the Agricultural Program

Statement	n	M[a]	SD
The FFA should revise the nature and focus of its contests and activities to open new categories of competition in addition to those in production agriculture and leadership.	130	4.68	1.07
Vocational student organizations, like FFA, should be part of every high school's co-curricular activities.	130	4.61	1.06
The FFA should encourage membership of students unable or unwilling to enroll in a 4-year program of agricultural education.	130	4.57	1.05
A substantial amount of agricultural marketing and distribution techniques should be infused into agriculture courses.	130	4.55	0.99
All schools with agricultural education programs should have FFA chapters.	130	4.38	1.40
Vocational student organizations, like FFA, should be part of every high school's intra-curricular activities.	130	4.15	1.35
The primary purpose of the FFA is to develop leadership.	130	3.98	1.30
Changing the name of the student organization in agriculture from the "Future Farmers of America" to "FFA" broadened the public perception of the organization to one with a contemporary, forward-looking image.	128	3.65	1.32
Agricultural education teachers are unduly driven by FFA contests and activities and place little emphasis on instruction in technical agriculture content or curriculum reform.	130	3.42	1.44
The FFA is the primary reason students enroll in agricultural education courses	130	2.60	1.20
Vocational student organizations such as the FFA are outdated concepts whose time have passed.	130	2.26	1.22

a. Means were based on responses to a six-point scale where 1=Strongly Disagree, 2=Disagree, 3=Slightly Disagree, 4=Slightly Agree, 5=Agree, and 6=Strongly Agree

As indicated in Table 7, the North Carolina public school principals tend to agree that their agricultural education teachers are doing an above average to superior job in each of the eight areas identified by the State's Teacher Performance Appraisal System. The principals agreed that their agricultural education teachers were performing at an above average to superior level in the areas of managing the behavior of students and performing non-instructional duties. The principals also indicated they slightly agreed that their agricultural education teachers were performing at an above average to superior level in the area of housekeeping and classroom/laboratory organization and management.

Table 7

School Administrator's Attitudes Toward the Teaching Performance of Agricultural Education Teachers

Statement	n	M[a]	SD
The agriculture teacher(s) at my school does an above average to superior job:			
Managing the behavior of his/her students.	132	4.99	1.52
Performing non-instructional duties.	132	4.65	1.20
Communicating within the educational environment.	132	4.39	1.26
Providing his/her students with instructional feedback.	132	4.37	1.25
With his/her instructional presentations.	132	4.33	1.23
With his/her instructional monitoring of student performance.	132	4.33	1.27
Facilitating instruction.	132	4.32	1.29
Managing his/her instructional time.	132	4.22	1.40
With his/her housekeeping and classroom/laboratory organization and management.	132	3.95	1.45

a. Means were based on responses to a six-point scale where 1=Strongly Disagree, 2=Disagree, 3=Slightly Disagree, 4=Slightly Agree, 5=Agree, and 6=Strongly Agree

CONCLUSIONS

The following conclusions were formulated as a result of the findings of this study:

1. In general, principals were very supportive of the agricultural education programs being offered in the public schools of North Carolina. They felt that the agricultural education teachers were doing an excellent job in the areas of managing the behavior of their students and performing non-instructional duties.

2. North Carolina principals felt that articulation of agricultural education training between secondary and post-secondary institutions should be increased, and secondary agricultural education programs should be fully articulated with community college programs through TECH-PREP agreements. However, it appears that they felt that agricultural education courses should remain at the secondary level and **not** be moved to the community colleges. They tended to support the notion that current agricultural education course offerings are appropriate for the curriculum of today's high schools. They also felt that agricultural education courses should be taught by fully certified agricultural education teachers.

3. North Carolina principals felt that school system with programs in agricultural education should have active advisory councils for their programs. Representatives from business should also be utilized to help school officials identify ways of infusing more instruction about agriculture into public school curricula.

4. While the secondary school principals did not feel that the agricultural education program **should** be viewed as an exemplary model of the educational reform movement, they agreed that funds being spent on agricultural education programs **would not** be better spent on other vocational and/or academic programs. They also indicated that agricultural education courses were appropriate for college bound students, and that there is a need for agricultural education programs in the public schools of North Carolina.

5. The benefits students derived from agricultural education were still deemed important by public school principals, and they felt that teachers in all grade levels and subject areas should be encouraged to incorporate materials about the economic aspects of agriculture in their instruction.

6. The principals stated that the FFA was an important component of the secondary agricultural education curriculum and that it was an appropriate co-curricular activity for today's contemporary high schools. However, the administrators felt the contests and awards used by the organization needed to be revised to opened up in more areas of competition which are not tied to agricultural production or leadership.

RECOMMENDATIONS

Based on the findings and conclusions of this study, the following recommendations are suggested:

1. Local vocational directors should work with local principals in establishing teams consisting of agricultural education and general academic teachers to identify opportunities for increasing the instructional content about agriculture in the academic curricula and for increasing integration of science content into the agricultural education curricula.

2. If not in place, fully articulated TECH-PREP agreements should be developed for all agricultural education programs.

3. Local directors of vocational education should monitor the hiring of agricultural education teachers and insist that only fully certified teachers be hired by their local school systems.

4. Local advisory councils should be established at the school building-level for all agricultural programs. Local teachers should provide leadership on the organization and establishment of advisory councils, but principals and local directors of vocational education should be heavily involved in the creation of the councils.

5. Agricultural education teachers should increase the number of computer literacy competencies in their local curricula. If computers are not available for instructional purposes, Agricultural education teachers should work with their local directors of vocational education to address the possibility of obtaining appropriate computer equipment and software.

6. Agricultural education teachers should extend invitations to their principals and local directors of vocational education to accompany them to state and national vocational student organization (FFA) activities. Agricultural education teachers should also extend invitations to their principals and directors to accompany them on selected SAE visits.

7. Agricultural education teachers should give more attention to addressing the instructional areas evaluated by the North Carolina Teacher Performance Appraisal System, and should make an effort to improve their housekeeping and classroom/laboratory organization and management skills.

8. Agricultural education teachers should work closely with their guidance counselors to encourage the counselors to direct college-bound students to enroll in their courses.

9. Additional research should be conducted to determine the attitudes of school level administrators for vocational programs other than agricultural education. Attitudes toward vocational education programs and course offerings by administrators other than principals, such as local directors of vocational education, superintendents, and guidance counselors, should also be investigated.

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A PRE-TEST POST-TEST ANALYSIS OF SELECTED MINORITY HIGH SCHOOL STUDENTS' ATTITUDES AND DEFINITIONS OF AGRICULTURE

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INTRODUCTION AND THEORETICAL FRAMEWORK

The number of minorities participating in the food and agricultural sciences is unacceptably low. In the fall of 1992, the enrollment of minorities in Colleges of Agriculture in the United States accounted for only 7.7% of the total undergraduate enrollment (FAEIS 1993). Virginia Tech does not fare as well as the national average. Compared to 13.3% minority undergraduate enrollment at Virginia Tech in the Spring 1993 semester, minorities in the College of Agriculture and Life Sciences accounted for only 4.6% of the undergraduate population (Virginia Tech University Information Resources 1993).

One explanation for this phenomena centers on the environment for potential minority students. Since the concentration of the minority population in the United States lies within urban boundaries (Green, 1989) limited exposure to agriculture and a narrow understanding of agricultural professions could contribute to the lack of interest in agriculture among urban minority youth.

A trend predicted in the next century is that the majority(Caucasian race) will become the minority and today's minorities the majority. If this takes place, agriculture as it currently stands will face a large human capital shortage.

The lack of minority role models currently in the field may also contribute to the seemingly low interest of minority youth in agriculturally related careers. If individuals do not see "themselves" in the contemporary industry, they may not be encouraged to pursue a career in that field.

Agriculture is already experiencing the effect of the lack of knowledge the public has about the animal industry. As minority populations grow, the lack of understanding may lead to an unfavorable attitude toward agriculture. Increasing minority participation in agriculture can be accomplished only through understanding the reasons behind depressed minority involvement.

The lack of exposure to agriculture can negatively affect a persons perceptions and attitudes toward agriculture. Attitude, as defined by Triandis (1971, p.30) is "An idea charged with emotion which predisposes a class of actions to a particular class of social situations." Attitude toward a particular subject or situation is the culmination of that individual's life experiences.

Virginia Tech and Virginia State University are interested in increasing minority participation in the food and agricultural sciences. They produced five interactive video teleconferences for the purpose of informing urban minority youth about agriculture. One goal of these teleconferences was to positively influence agricultural attitudes among this group of students.

Triandis (1971) stated that attitudes are strong indicators of behavior. Breckler and Greenwald (1989) found that individuals who have a positive attitude toward a subject or situation tend to evaluate them positively. Since attitude can be a strong predictor of behavior, measuring attitudes of minority students toward agriculture may lead to an understanding of low minority participation in the food and agricultural sciences.

Most authorities agree that attitudes are learned and implicit. Experts in the field also concur that attitudes can be referred to as "tendencies of approach or avoidance" or as "favorable or unfavorable"(Osgood, Suci & Tannenbaum, 1970). In addition, attitudes will vary in intensity. Attitude also represents an internal mediational activity that is used as an evaluative tool (Osgood, Suci, & Tannenbaum, 1970).

With these assumptions in place, attitude in the general sense becomes easier to define. If we assume that attitudes represent favorable or unfavorable feelings, we can place attitude on a continuous, bipolar scale. If attitude is a part of an internal mediation process, it is a part of the theoretical model and a component of the semantic structure (Osgood, Suci, & Tannenbaum, 1970).

Semantic differential scales were originally developed by Osgood, Suci, and Tannenbaum in 1957 (Mayerberg & Bean, 1978). The semantic scale is divided into the attitudinal domains of evaluation, potency, and action. As in any measure of constructs, the goal of semantic scales is to maximize variance among individuals. Bipolar semantic scales with high loadings such as good - bad where the extremes are clearly defined will, maximize variance. Bipolar semantic scales with restrictive loadings that are based on intuition such as constant - changing usually add a small to negligible amount of variance.

Open ended questioning is an effective way to assess a persons perceptions of a construct. Morgan (1988) suggested two basic approaches to analyze qualitative data. The ethnographic approach centers on direct quotations from participants; the content analysis approach involves coding data and producing numerical summaries of the results.

PURPOSE AND OBJECTIVES

The purpose of this study was to determine the effect of an informational program about agriculture on the attitude of selected urban minority high school students.

The specific objectives were to:

1. determine the overall attitude of urban minority high school students toward agriculture prior to treatment and after treatment,
2. determine if significant differences exist between pretest and posttest attitude scores

3. ascertain the definition of agriculture held by urban minority high school students prior to treatment and after treatment, and
4. determine if the treatment affected minority student definitions of agriculture.

METHODS AND PROCEDURES

Description of the Population

The population included the students from urban schools participating in "Connections" (a collaborative project by Virginia State and Virginia Tech to increase minority participation in the food and agricultural sciences). Of the 12 schools participating in the Connections program, three agreed to participate in this study. A total sample of 47 student pretest and posttest responses collected for this quasi-experimental study.

Instrumentation

The instrument developed for this study consisted of 17 bipolar pairs on a six point scale and two open ended questions. The instrument was validated by a pilot test administered to a group of undergraduate students at Virginia Tech and a panel of experts from Virginia Tech, Virginia State, and the advisory committee for Connections.

Data Collection

The pretest instruments were distributed to teachers in the cooperating schools on October 11, 1993. The completed pretest surveys were returned by mail. All surveys were received by November 17, 1993. The posttest instruments were distributed after the students viewed one, two, or three "Connections" video conferences. The posttest instruments were distributed on May 15,1994 and were returned by June 30, 1994.

Statistical Methodology

Descriptive statistics, t-tests and qualitative methods were used to analyze the data.

RESULTS AND/OR FINDINGS

Pretest and posttest attitude of urban minority high school students toward agriculture. This objective was measured by calculating the evaluation, potency, and action components of the semantic differential instrument and calculating a total attitude score based on these individual components. All components and the total score could range from a low of -3 to a high score of +3 (a seven point scale). A negative score reflected a negative attitude domain while a positive score reflected a positive attitude domain. A score of zero indicated a neutral attitude in the domain. See table 1 for details of pretest and posttest scores.

Ascertain if there were significant differences between pretest and posttest attitude scores. Significant differences (t-probability <.05 alpha) were found between pretest and posttest scores in the action domain and in the total attitude score (Table 1).

Table 1

Pretest and Posttest Scores, Standard Deviations, and t-tests n = 47

	Pretest		Posttest		
Domain	Mean	SD	Mean	SD	t-prob
Evaluation	1.2	1.2	1.4	1.2	.16
Potency	.3	1.0	.6	1.0	.1
Action	.6	1.0	1.2	1.1	<.05
Total	1.6	1.5	2.1	1.6	<.05

Ascertain the pretest and posttest definition of agriculture held by urban minority high school students. This objective was attained via an open ended question and analyzed through qualitative means.

Prior to reporting the results of the content analysis of the two open ended questions, background information needs to be relayed. The percents related to the first question are based on the total number of responses that equaled more than 47 for the pretest (the actual number of responses was 51) since several respondents gave compound answers and exactly 47 for the posttest. On the pretest, three students or about six percent of the students left the question blank and seven students equaling approximately 15% of the students did not answer the question. The second question percents are based on just the 47 respondents' yes, no or maybe choices. Only two students or 4% of the group left the second question unanswered on both the pre and posttests.

Definition of Agriculture

In reviewing the replies of the students, the most common definition for agriculture on both the pre and post tests was farming. Twenty-six students (51%) gave this response on the pretest however only 19 or 40% responded in this fashion on the posttest. A prominent secondary theme of answer for the pretest results was one focusing on definitions including elements of "the study of the land, plants and animals; a study to help make the land more productive; and the study of food." This group of answers accounted for 15 or 29%. Two less significant themes were found to be definitions including aspects of working with nature or being outdoors -- 4% and definitions using the term's science and technology -- 4%. The remainder of the responses were "making food healthy," "good people trying to help other people," and "a way of life."

The posttest results notable secondary theme involved definitions utilizing the concept of food -- "providing food for us to live," and "all aspects of the growing of, healthiness of and the different uses of food." Seventeen percent responded in this fashion. Three, or six percent of the students' answers revolved around the terminology of science and technology and two, or four percent of the students' responses included aspects of working outdoors. The remainder of the posttest definitions varied widely in scope from "I don't know," to "aquaculture & Hydroponics," to "a way of life," to "growing of plants to find new cures." This heterogeneous group consisted of eight responses or 17%.

The largest difference in the two sets of responses was the lessening of the definition of farming from a 51% response rate to a40% response rate. A difference in the overall definitions in the posttest explaining agriculture in more non-traditional terms is apparent as well.

Consideration of a Career in Agriculture

Inspection of the responses from the pretest to the second question, "Would you consider a career in agriculture? Why or why not?", were 21 (45%) said yes, 17 (36%) said no, and seven (15%)indicated a maybe response. In comparison the results of the posttest were 24 (51%) answering yes, 15 (32%) no and six (13%) indicating a maybe response. The overwhelming majority of students also answered the why or why not part of the question.

Students replying affirmatively in the pretest gave twelve different reasons for their choice whereas the students in the posttest gave fifteen different reasons. The most common responses (11%) for both groups were "I like working outdoors" for the pretest and "because it is interesting" for the posttest. These reasons were followed by "I like to farm and like animals" (6%) for the pretest group and "I've been raised around it" (4%) for the posttest group.

Reasons given for negative responses in the pretest numbered 11 and seven for the posttest group. Two top reasons for both groups emerged receiving six responses each which amounts to 13%. One of the reasons given was "not interested" and the other was "not the field I want to go into." In the posttest responses, however, specific fields were named more often than in the pretest results. Examples were cosmetologist, accountant and police officer.

The ones who were undecided in the pretest gave as their most common response, "don't really know what it is about" and in the posttest gave as their common response, "if there wasn't so much science involved."

CONCLUSIONS AND/OR RECOMMENDATIONS

Conclusions

1. The agricultural informational program presented to urban high school minority students had a positive impact on both their attitude in the action domain and their overall attitude toward agriculture.
2. Of the high school students responding to define agriculture, the most popular definition is still farming although the definitions become more non-traditional, varied and specific in the posttest group.
3. The high school students surveyed may have a higher tendency after viewing the teleconferences to pursue career choices in the discipline of agriculture.

Recommendations

1. Informational programs like the one presented in this study should be used to increase attitudes of urban minority students toward agriculture.
2. Informational programs like the one presented in this study can influence urban minority students to choose an agriculture related career.

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CAREER ASPIRATIONS OF MINORITY YOUTH IN ONE COMMUNITY IN THE RURAL MISSISSIPPI DELTA REGION OF THE U.S.

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CAREER ASPIRATIONS OF MINORITY YOUTH IN ONE COMMUNITY IN THE RURAL MISSISSIPPI DELTA REGION OF THE U.S.

INTRODUCTION AND THEORETICAL FRAMEWORK

There is little question that minorities are under represented in professional roles in the agricultural sciences and technologies. Agricultural professionals who have worked with rural minority youth have noted that these youth seem to be less interested in careers in agriculture than are non-minority youth. However, there is a paucity of data to substantiate this observation. Studies by Marshall (1989), Metzger (1985) and Valverde (1980), which explored the under representation of minorities and women in professional and administrative jobs in education, suggest that stereotyping, discrimination, constraints imposed by self and family, low career aspirations, lack of confidence and initiative, and lack of sponsors are causes for low participation by these groups.

Some evidence suggests that minorities experience significant barriers which may be covert and which may restrict their preparation for and entry into professional roles. These barriers may be both cultural and institutional. An article entitled, "The consequences of the American caste system" by Ogbu (1986) argued that minority groups who were incorporated into American society against their will are different than Whites and from other minority immigrants. He called these minority groups "castelike minorities" which include Blacks, Hispanics and Native Americans. Boykin (1986) posited that minorities must cope within three social streams. There is a "mainstream" or majority culture in which all groups interact, including Whites. There is a separate minority culture to which all minority groups contribute and interact. Each individual minority group has its own distinct culture of actions, reactions, and experiences which interacts with the majority culture with varying degrees of success. Longstreet (1978) suggested that ethnic groups are unique according to five aspects: verbal and nonverbal communication, orientation modes, social value patterns, and intellectual modes. In observations of minority and non-minority students in classroom settings, the students were found to be different on these factors.

In Career Patterns in Education (1982) Ortiz noted that minorities are often placed in special projects which are designed to mediate cultural differences and aid their infusion into the majority culture. She declared that minorities placed in special projects did not interface with the organization in the same manner as white professionals, the socializing agents of most minorities were minorities themselves, minorities were socialized to interact with their respective racial/ethnic communities as opposed to the organization itself, and being confined to special projects constrained their movement within the larger organization.

Parker and Lord, in a 1993 article, described the characteristics of role models for young African-American men. They cited Wakelee-Lynch who noted the plethora of negative articles about Black males and that little attention is given to "...what is positive and productive about successful, legally employed African-American men." They concluded that little is known about the familial, educational, and societal support systems that have contributed to their successes. Citing Conner they concluded that the more the development and qualities of these positive role models is understood, the greater the chances that growth-enhancing guidelines can be developed to replicate such experiences for younger African-American men.

A study of agriscience students in Texas high schools found that minority students "... perceived more barriers to enrolling (in agriculture courses) and had more negative attitudes toward agriculture and agriculture occupations" (Talbert & Larke, 1992). The numbers of minorities in these career roles may be increased by developing an understanding of the underlying social and cultural causes for the apparent lack of interest or participation in these professional roles. This project sought to develop an understanding of the career-related decision making processes used by minority youth in a predominantly Black community in the rural Mississippi delta region of the Southeastern United States.

PURPOSE AND OBJECTIVES

This report is part of a larger study to develop an understanding of the social and cultural issues which affect the career-related decision making patterns of rural minority youth. The purpose of the portion of the study reported herein was to identify perceptions about professional careers, especially those related to agriculture, held by minority youth from a rural community in the Mississippi River Delta region of the Southeastern United States.

The following objectives were used to guide the study:

1. To identify perceptions about professional careers held by minority youth.
2. To identify perceptions about higher education held by minority youth.
3. To identify perceptions about agriculture - related careers held by minority youth.
4. To identify sources of information used by minority youth in career planning.
5. To identify key influencers in career planning by minority youth.
6. To identify factors which are perceived as inhibitors to the pursuit of a professional career by minority youth.

METHODS AND PROCEDURES

As this report is part of an on-going study funded by the State Agricultural Experiment Station, some procedures were used to facilitate parts of the study not reported herein. The larger study utilized both positivistic (quantitative) and naturalistic (interpretive) modes of inquiry. This report is from the interpretive findings of one of the sites in the study.

Interpretive studies require the use of accepted procedures (see Hultgren & Coomer, 1989). The procedures used in this study were:

1. the identification of a community purposively selected for desired attributes,
2. the collection of anecdotal observational data from the community,
3. the collection of anecdotal interview data from subjects in the community,
4. the organization of the data into coherent themes to explain the phenomena under study, and

5. the selection of data to illustrate the themes as findings within the context of the community under study.

In interpretive studies, the researchers act as primary data collection instruments. Thus, some understanding of the researchers is important to the reader of the research report. Three researchers participated in the study. One was Black, the other two were Caucasian. One was a female. One researcher grew up in the geographic region under study and in a similar cultural group, and had some understandings of the larger cultural background of the subjects. This individual had worked as an agricultural professional in the region. The second researcher had grown up near the region in which the community existed, and had worked as an agriculturally-related professional within the region. The third researcher had no personal background or professional experience in the region or in the cultural group under study, but had conducted several similar studies.

One community in the Mississippi River Delta region with a significant minority population was identified. A key minority leader in the community was identified. Community leaders selected for the larger study were purposively selected as individuals who were respected by the target group, and may not necessarily have been traditional leaders such as elected officials or school personnel. This individual was explained the objectives of the project and solicited for his support and participation. He served as the contact through which the project researchers obtained entry into the social and cultural aspects of the minority community.

The target population for the study consisted of minority youth in a predominantly Black community in the rural Mississippi River Delta region of the Southeastern United States. The accessible population consisted of high school age youth in the public school in that community. The school is predominantly Black.

In order to obtain anecdotal data, focus group interviews (Krueger, 1988) were conducted with groups of high school students from the community. An analysis of the related literature provided the basis for the development of an interview protocol by which to collect interpretive data from the subjects. Seven focus group interviews were conducted with approximately 12 subjects in each group, for a total of 86 subjects. These interviews were conducted at the high school by the researchers. Additionally, individual interviews were conducted with approximately 16 subjects.

Observation notes were taken of economic, social and cultural conditions within the community. The interviews were audio-taped and the tapes were transcribed. The interview transcripts and the observation notes were studied for the presence of recurring themes. These ideas and their interrelationships were examined for patterns based upon how and where words and actions were used within the context under study.

RESULTS

The following results are consensus opinions and perceptions held by youth in the community under study. It should be noted that in some cases not all youth agreed. However, the inclusion of any findings in this report indicates a very strong agreement among the subjects.

Perceptions of Professional Careers and Higher Education

Higher education was seen by minority youth in this community as a "way out" -- a way out of a future life of low wages, a way out of a life of working for someone else, and a way out of the community. Higher education was also seen as a way to access professional careers. These youth believed that little opportunity existed in the community for them to make good wages and to be successful as professionals. This perception was influenced by key adults in their lives.

Many of the youth interviewed indicated a strong interest in a career which they felt was accessible only with some higher education. Many indicated an interest in careers which required a four-year degree or more. Some felt that college was necessary to achieve a specific career objective, while others expressed thoughts that just having a college degree was a worthy aspiration, regardless of whether it prepared them for a specific career.

One senior with self-assured anticipation stated,

> "I'm the first in my family to go to college."

Another added,

> "Me, too!"

One student expressed some anxiety resulting from parental pressure for her to go to college,

> "I would be highly embarrassed if I didn't go to college. My parents would make me. I probably wouldn't have any other choice but to go."

When asked, "But do you want to go (to college)?" She responded emphatically,

> "Yes! I want to get out of the house!"

Another student voiced the parental value placed on education as a vehicle to achieve success.

> "Yes, parents push you. You know, to further your education because they don't want you to do like they did, because some didn't go to college. That's why they want you to be more than what they were. And when you compare a person who went to college and a person that just finished high school, you compare and you can see the difference."

When asked why he planned to go to college, one student responded,

> "Because I want to further my education. I know when I go to college, you know, get a certain degree or whatever, I know that I can get a better job than

> just getting right out of high school trying to get a job. ... I want to be more than just a McDonald's type of worker. I want to be recognized."

Students were asked to complete the sentence, "You see college as a way to...." Responses included,

> "To free yourself from all of this (way of life)."
>
> "To improve yourself."

When asked what kinds of factors they considered when trying to decide which college to attend, students responded with a variety of concerns.

> "The money." (cost of attending college)
>
> "Scholarships (available)"
>
> "(To get the) best education."
>
> "The career field (I'm interested in)."
>
> "(One should) try to determine how graduating from (a particular) college is going to (best prepare you for a specific career)."

Some wanted to be as far from their home community as possible. Some wanted to be close to their families.

> "The location of the college."
>
> "The distance away from home...."

Being able to see one's family regularly, the prestige of the college, and the size of the college -- some like it small, others like it large -- were each considerations voiced by several students.

Perceptions of Agriculture

These youth held negative perceptions about the possibility of professional careers in agriculture. They associated agriculture with low skill, low wage labor intensive jobs. Many indicated that a family member had worked in agriculture in some form of unskilled labor. It should be noted that the school had, what the researchers believed to be, a typical agricultural education program.

When asked what they felt about careers in agriculture, representative responses included,

> "Don't know anything about it."

> "Farming."
>
> "... fields, tractors ...."
>
> "Well, I just don't want to mess with dirt and all that stuff, cause that"s all I know about it."
>
> "I know they plant trees and work with dirt and all that."
>
> "My (family member) worked on a farm. He (doesn't) work on a farm now, but he worked with cotton and all that. I don't think I would like doing that. Because it's boring. All they do is sit there. Maybe if I knew more about it."
>
> "I don't have anything to say about agriculture because it's a boring subject."
>
> "I can't relate to it. I relate it to the soil, you know, being dirty and all that stuff. Smelling like plants and all that stuff."

When asked about the possibility of enrolling in a high school agriculture course, typical student responses included,

> "It doesn't seem like something I would be interested in."
>
> "... the first thing they (parents) are going to say is 'boring.' (My) folks have been doing it for so long. Being in the South, too, I don't want to be doing the same stuff my folks have been doing...."
>
> "You know, because people don't talk about it .... a lot of people don't just sit up and talk about agriculture. That's why I know nothing about it. That's why I think it's just boring. I never took that class (agricultural education), and it's just boring to me."

When asked if they could name someone who worked in agriculture, student responses were indicative of their narrow perception of agriculture as farming:

> "My daddy used to work on a farm."
>
> "My daddy used to work on a farm too, but he (doesn't any) more."
>
> "I want something that's going to take me places."

Sources of Information About Careers

The minority youth in this study identified several influential sources of information about career opportunities. When asked to identify sources of information used to find out about careers, students responded with several school-based sources. Others identified family members and career professionals as important sources of information.

> "Well, you got to do research. Such as going to the library and checking out different books."
>
> "By looking in magazines, career magazines, reading books."
>
> "Talk to counselors."
>
> "Talk to somebody in that field."
>
> "Get information for different colleges."
>
> "Going to career days...."
>
> "Your family. I guess, being the youngest, I can talk to my brother and sister, and then my parents."
>
> "My mom works in a hospital...."
>
> "All of the people coming to school to talk about the medical profession. They talk about how much money they are making, and all that."

Key Influencers in Making Career Planning Choices

Minority youth indicated several influencers that were key in their career planning decisions. The types of courses taken in high school and their personal interests were influential in their career planning. Individuals who were influential included their parents, the school counselor, and professionals with whom they had contact. It should be noted that the school arranged for professionals to visit the school on a regular basis.

Students were asked, "What are some things that influenced you to be interested in (your chosen) career fields?" Typical responses included,

> "I guess how good you are in those fields. It depends on how good you are in math or chemistry, science, something like that."
>
> "... it depends on how good you are with people."
>
> "I chose my career because I love math...."

Parents encouraged youth to go to college and pursue a professional career.

> "My dad makes deals. 'I'll get you a car if you go.' "

The question, "Who has been most influential in helping you make a decision about careers?" was posed to students. Typical responses were,

> "My dad."
>
> "My family and my brothers and my sisters."
>
> "My dad has influenced me. He wanted me to be a doctor. He told me to check out these books and started giving me homework on it, on those books and stuff."
>
> "People in the community. Like (a named specific individual). He's in the White House right now. He graduated from this school."
>
> "Some of the teachers."

Many students indicated that financial security was a key influencer in their career choice.

> "All of us are looking for careers in order to make money, you know."

It was observed that the school had an extensive set of career planning and college recruitment materials. A whole room was set aside as a resource room. Filled with career and college information. Counselor was very active in assisting students in finding information about careers and higher education.

Inhibitors to Pursuit of Professional Careers

Students were asked to identify things that they believed would inhibit their pursuit of their career choice. The consensus concerns focused on factors which would prevent their attending and from completing the college of their choice. Increasing academic standards for admission at most colleges, and differences in admission standards between colleges, were seen as inhibitors. Some felt that increasing admission standards might prevent their admittance to the college of their choice and thus prevent them from attaining career success. They may have to choose a less prestigious college, or may have to choose a two year college or vocational school rather than a four year college.

Not completing college was seen as another inhibitor. Expected reasons for not finishing included a lack of focus in their academic studies -- articulated as "too much partying." A lack of financial resources to complete college was also seen as an inhibitor. Students articulated this as concern over the high cost of tuition and fees. Peer pressure not to attend college was not a problem.

CONCLUSIONS

High school students in this predominantly Black community viewed higher education as a means to achieve professional careers. Many had aspirations of professional careers as a vehicle to gain access to what they felt would be a better life than could be attained in a rural community. Few had aspirations of remaining in or returning to the community. This has potentially devastatingly negative implications for the community if youth who are able to achieve professional careers do not return to contribute personally and professionally to their home community.

These youth held perceptions of agriculture which were generally negative. They characterized agriculture as hard work, long hours, requiring unskilled labor and earning low wages. As an observation, one might conclude that their perceptions were the result of their limited experiences with agriculture in their community. Agriculture in this community is largely production agriculture based on cotton, rice and soybean production, with the associated processing jobs such as cotton ginning. They have had little exposure to the professional business and science careers in agriculture.

Students in this community attain information about careers largely from school-based personnel. Other sources of information include career professionals, career days, family, and written information. The school personnel provide written information on careers and opportunities in higher education. They arrange for career professionals to visit the school.

It would appear that school personnel have a significant influence on the career choice of youth by selecting the types of career opportunities and college choices to which students are exposed. Any personal bias held by school professionals for or against particular opportunities could be evident in the students' choices. It was observed by the researchers that this school had the highest proportion of students attempting higher education in the State. This may indicate a preference for professional careers which require a college degree at a proportion that is higher than would be expected. Further, many of the students expressed to the researchers particular interests in careers in the medical professions. Students indicated that medical professionals routinely participated in school visits and career days.

Given the apparent power of influence by school officials on the perceptions of career opportunities available for youth, if a goal was to encourage interest in professional careers in agriculture, then agriculture professionals such as agriculture scientists could be routinely invited to participate in school visits. The effect of this may be to positively alter the perception of agricultural careers held by these youth.

Students indicated that parents or other family members were the most significant influencer on their choice of careers. Professionals who visited the school, their counselor, and other school officials were also significant. The youth reported that their parents expressed a desire for their children to have a better way of life than they had.

Several factors were identified by the youth as important considerations in determining if and where they would attend college. The availability of financial resources, location of the college relative to their home, and a sense of achieving the best education to meet their career goals. Students indicated some concerns which they felt might inhibit their ability to achieve their educational and career goals. These included the costs associated with college, and academic criteria for admission to and completion of their college program.

Only one student indicated that the racial composition of the student body would be a factor in college choice, and that it was of "the lowest" importance in making decisions. It is widely accepted that minority adults encounter inhibitors based on race in career and college. Are the racially based inhibitors encountered by adults more apparent, or have these youth grown up in a protected environment in their community and have yet to encounter such racially based inhibitors? This question was beyond the scope of the original study reported herein. However as an interpretive study, it will be pursued in the larger study to develop understandings of minority youth responses to racially based inhibitors in their career decision making processes.

As an interpretive research study, this study sought to describe the decision making patterns of youth in a predominantly minority rural community of the Mississippi Delta Region of the U.S. Focus group interviews, individual interviews, and researcher observations served to build a profile of these students. Students in this community indicated a high degree of interest in professional careers which require a college degree and viewed those careers as vehicles to escape their community. Agriculture was not seen as a source of opportunity for professional careers in agriculture.

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AGRICULTURAL EDUCATION AND LAND-GRANT INSTITUTIONS - THE REST OF THE STORY

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AGRICULTURAL EDUCATION AND LAND-GRANT INSTITUTIONS - THE REST OF THE STORY

INTRODUCTION AND THEORETICAL FRAMEWORK

Since its earliest days agricultural education has had a close working relationship with land-grant universities. This relationship even pre-dated the Smith-Hughes Act of 1917. The majority of agricultural education teacher training departments have been and are still located at land-grant universities. Consequently, the majority of agricultural education teachers claim such universities as their alma maters. The same universities also represent an important source of subject matter assistance for agricultural education teachers.

The road to the establishment of land-grant universities was not a smooth one. In fact, it took several attempts and a war to bring about their establishment. There was even controversy over who deserved credit for developing the land-grant concept. Once the 1862 schools were created, the ties to agricultural education were slowly, but steadily established. These ties involved a federal act to create experiment stations and other federal legislation.

Contemporary agricultural educators need to know the accurate background of the establishment of land-grant universities. They also need to know that teacher training in agricultural education almost came about through normal schools rather than land-grant universities. Such a background gives insight to how current universities function and why agricultural education has such close ties to land-grant universities.

PURPOSE AND OBJECTIVES

The purpose of this study was to examine the people and events that led to the establishment of 1862 land-grant universities and determine the historical thread of agricultural education ties to land-grant universities. Specific objectives accomplished were:

1. Determine who deserves credit for creation of land-grant universities.
2. Examine the controversies surrounding the 1862 act.
3. Determine how land-grant universities came to play a prominent role in agricultural education.

METHODS AND PROCEDURES

Historical research methods were utilized to accomplish the objectives of the study. Both primary and secondary sources were utilized to obtain the information needed. Primary sources included mass media publications, Congressional records, texts of both state and federal legislation, and speeches. Secondary sources included books. Information was collected at numerous sites including the Library of Congress, United States Department of Education Library, National Agriculture Library, and various land-grant university libraries. All references were subjected to both internal and external criticism.

RESULTS AND/OR FINDINGS

Who Deserves the Credit?

Many give the credit for passage of the 1862 act to Justin Morrill of Vermont. Certainly, he played a prominent role in its passage and had the political astuteness to be successful in the process. Some refer both formally and informally to it as the Morrill Act. However, someone had to have the initial idea for the concept before such a bill could even be introduced in the United States Congress. Primary credit for that idea belongs to Jonathan Baldwin Turner of Illinois.

Jonathan Turner

In 1851 Jonathan Baldwin Turner gave a speech to the Farmers Convention at Granville, Illinois entitled "A Plan for an Industrial University for the State of Illinois." In the speech Turner emphasized the point that society had two classes, the professional and the industrial. He noted that five out of 100 were needed in the professional class, while 95 were needed in the industrial class. He next bemoaned the fact that higher education educated and trained professionals, but not industrial workers. "But where are the universities, the apparatus, the professors and the literature, specifically adapted to any one of the industrial classes?" (Turner, 1851, p. 2)

Turner continued on to suggest that every state should have a university for the industrial classes. Specifically, for the state of Illinois he wanted a university with a quantity of land varying in soil and aspect, experiments in agriculture and horticulture, and open to all classes of students. He suggested experimentation during the warmer months and instruction by lecture during the colder months. He advocated a school-wide curriculum on such topics as anatomy, physiology, instincts and habits of all animals, soils, and bookkeeping. In fact, he suggested that "no species of knowledge should be excluded, practical or theoretical." (Turner, 1851, p. 2)

By the time he gave his speech describing very accurately what was to become the land-grant university, Turner had worked for almost 20 years helping to promote general education in Illinois (Carriel, 1961). His background included farming experience in Massachusetts and teaching at Illinois College in Jacksonville starting in 1833 (Carriel, 1961).

After Turner's speech at Granville in 1851, the Farmers Convention adopted a resolution calling for an Illinois state university for the industrial classes (Carriel, 1961). At Turner's urging and largely because of his influence, the Illinois state legislature passed a resolution urging the United States Congress to a pass a law ". . . donating to each state in the Union an amount of public lands not less in value than five hundred thousand dollars, for liberal endowment of a system of industrial universities, one in each state of the union . . ." (Carriel, 1961, p. 116)

In a speech entitled The Origin of the Land Grant Act of 1862 and Some Account of Its Author Jonathan B. Turner made by Edmund J. James, President of the University of Illinois in 1910, the point was made that Turner deserved much more credit than he received for conceiving the idea of the Land-Grant Act and working for its passage. President James made the following points:

> There is no desire to detract one iota from the credit due Mr. Morrill for his earnest, wise and persistent advocacy of the policy of Federal aid to education. On the other hand, the credit for having first devised and formulated the original plan and of having worked up the public interest in the measure so that it could be passed belongs clearly to Professor Turner and should be accorded him. (James, 1910, p. 8)

Justin Morrill

The Congressman from Vermont who has received most of the credit for the Land-Grant Act, in fact, has even had his name attached to the Act, was Justin Morrill. He was raised a lower class farm boy. Morrill's education experience was limited as he left school at age 14 (Atherton, 1900). After a successful and satisfying career as a businessman, many expected him to retire. However, he decided to enter the world of politics and proved to be a very effective member of Congress (Atherton, 1900).

Some of his spoken words express Justin Morrill's philosophy. While speaking on behalf of the land grant bill of 1858 he said:

> The prosperity and happiness of a large and populous nation depend: (1) Upon the division of land into small parcels, and (2) Upon the education of the proprietors of the soil. Our agriculturalists, as a whole, instead of seeking a higher cultivation, are extending their boundaries; and their education, on the contrary, is limited to the metes and bounds of their forefathers. (Morrill, 1858, p. 4)

Milton Eisenhower, while serving as president of Pennsylvania State University, reported that Congressman Morrill indicated his philosophy concerning the people who would benefit from the act when Morrill stated ". . . the design was to open the door to a liberal education for this larger class, at a cheaper cost, and to tempt them by offering not only sound literary instruction but something more applicable to the productive employments of life." (Eisenhower, 1955, p. 64)

Controversies of the Act

When the bill was first introduced in 1857 by Justin Morrill, it called for the establishment of colleges for the benefit of agriculture and mechanic arts. According to the 1862 bill's purpose it was to provide:

> . . . the endowment, support, and maintenance of at least one college in each state where the leading object shall be, without excluding other scientific or other classical studies, to teach such branches of learning as are related to agriculture and the mechanic arts, as the legislatures of the states may respectively prescribe, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life. (Morrill Land-Grant Act, 1862, p. 503)

The 1857 version of the bill provided that each state be allocated 20,000 acres of public land for each member of Congress (Cohen, 1974). The final version changed to 30,000 acres per member of Congress (Morrill Land-Grant, 1862). Because many of the eastern states no longer had any public land, the bill called for land script to be issued to those states to finance the purchase of land needed for the college. In the western states there remained large tracts of government owned land that had never been homesteaded. An eastern state that had no available, suitable land would be issued script for western state land. The eastern state would then sell the western land and use the money to finance the purchase of land for the new college. This provision of the bill caused considerable opposition. Some lawmakers believed that the issuance of land script would open the door to the land speculators who would take advantage of the procedure to reap huge profits. Senator Pugh of Ohio, in arguing against the bill in the Senate, said:

> Every particular script will be thrust on the market by all the states at once; and what will be the price of it on the market? Nominal. Each of the states will derive a mere pretense, no valuable consideration from her grant; she will never be able to get any land; but the speculators who buy in a falling market, will get hold of it, and will locate the script by empires on your public domain. (Congressional Globe, 1859, p. 715)

The greatest opposition came from the senators and representatives from the South. In the 1850s the raging debate in government was over the power of the federal government versus the power of the states. Southerners had long since been vocal over what they considered an encroachment by the federal government of the powers constitutionally delegated to the states. Because the constitution made no provision for any type of nationally funded education, they considered the bill to be not only unconstitutional, but another means by which proponents of a strong central government could seize more power. Senator Clay of Alabama argued before the Senate:

> The people do no favor this measure. They may have been beguiled into the advocacy of land grants for agriculture, but they have never consented to surrender the supervision, control, and direction of their education of the Federal Government . . . It will unlimit all the limitations of the powers of Congress; will efface all the lines that define the boundaries between Federal and States rights; confound all the separate and distinct duties of State governments and will be a long step towards the overthrow of this truly Federal and the establishment of a really national government. (Congressional Globe, 1859, p. 852)

Although there was vigorous opposition to the measure, many Congressman favored the bill. Legislation aimed at improving both agriculture and education naturally drew support. In February of 1859 the bill narrowly passed both houses of Congress and was sent to President Buchanan for his signature. Buchanan described the bill as both inexpedient and unconstitutional and vetoed it for six reasons. They were: (1) The loss of the land would deprive the federal government of too much revenue; (2) The federal and state spheres of operation are separate and distinct, this would overlap the spheres too much; (3) New states would have the possible handicap of losing land to other states upon entry into the Union; (4) Because the federal government could not enforce rules within sovereign states, the land might not be used for its intended purpose; (5) New colleges would interfere with already established colleges that teach scientific agriculture; and (6) A belief that there was a legitimate constitutional issue over the legality of having the federal government give away land owned by a sovereign state (Rasmussen, 1975).

By 1862 the United States had a new president and a new Congress following secession of the Southern states to form the Confederate States of America. With those changes, Congress was able to pass the land-grant legislation and it was signed into law by President Lincoln on July 2nd.

Prominent Role in Agricultural Education

With the development of Congressional District Agricultural Schools in Alabama, Georgia, and Virginia as well as the newfound popularity of agricultural education with several thousand students enrolled in the early 1900s, there was a need to prepare agricultural education teachers. Crosby noted in 1905 that of a total of 182 normal schools in the United States, 64 taught agriculture. He further indicated that ". . . in 11 of the normal schools, agriculture is taught by teachers of agriculture, in 11 by teachers of science and agriculture, in 35 by those designated teachers of science, and in the remaining 7 by other teachers--principals, teachers of pedagogy, economics, etc." (Crosby, 1905, p. 212) He further noted that this was better than one would expect with such a new movement.

Other people were beginning to believe that agricultural education teachers should be prepared at land-grant universities. For example, the Nelson Amendment was approved March 4, 1907 as an amendment to the Agricultural Appropriations Bill (Nelson Amendment, 1907 and Robison & Jencks, 1913). It permitted federal funds to be used by colleges of agriculture to provide courses for the preparation of instructors to teach the elements of agriculture and mechanics arts. In 1908 $25,000 was appropriated annually to each state for this purpose (Nelson Amendment, 1907 and Wheeler, 1948). Wheeler went on to predict that seven years after passage of the Nelson Amendment, 60 or more professors of agricultural education, charged with the duty of training teachers of agriculture, should be in position.

At about the same time the Georgia legislature approved a law permitting the establishment and maintenance of schools of agriculture and mechanic arts. Act No. 448 was passed in 1906 and stated:

> That the Governor is hereby authorized to establish and cause to be maintained in each congressional district of the state an industrial and agricultural school in

> accordance with further provisions of this Act. Said schools shall be branches of the state College of Agriculture, a department of the University of Georgia. (Act, 1906, p. 72)

Earlier the Alabama legislature passed the first Congressional district school legislation on February 28, 1889. Act No. 579 established two branch agricultural experiment stations and agricultural schools at the same location (Acts, 1889).

By 1908 a second major push was made to have normal schools train vocational teachers, including agricultural education teachers. The Bill to Provide for the Advancement of Instruction in Agriculture, Manual Training and Home Economics in the State Normal Schools of the United States was introduced by Senator Burkett of Nebraska. While the bill was not passed by Congress, normal schools did receive a lot of attention as a possible source of agricultural education teachers. In a statement on the Burkett Bill before the Senate Agriculture and Forestry Committee, Homer H. Seerley, President of the State Normal School of Iowa located at Cedar Rapids, made an interesting point and a dig at land-grant universities.

> We have hoped that the National Government would do for the normal schools in small measure what they have attempted to do for other institutions of learning, like the mechanics arts colleges and the agricultural colleges, in order that we may carry this encouragement and this instruction to the country schools; and by means of the normal schools we feel that this problem can be very much better solved than by any other agency with which we are acquainted. (Hearings, 1908, p. 3)

That same year the federal bill for vocational education showed the influence of such thinking and lobbying. The Dolliver-Davis Bill (a predecessor to the Smith-Hughes Act), had a provision for the training of vocational teachers, including agricultural education teachers, to be done at normal schools. The same provision was repeated in the 1910 version of the vocational bill (Swanson, 1962).

However by 1911 the federal legislation had evolved to the point of showing preference for land-grant universities. The Page-Wilson bill preface stated: "To cooperate with the States in encouraging instruction in agriculture, the trades and industries, and home economics in secondary schools; in preparing teachers for these vocational courses in State colleges of agriculture and the mechanic arts . . ." (Senate Bill S 3, 1911, p 1) The 1917 Smith-Hughes Act called for the preparation of vocational teachers; however, it did not specify at what institutions.

The place of the normal school for the preparation of agricultural education teachers became primarily one of emphasizing elementary teachers. A. C. True, director of the Office of Experiment Stations for USDA, agreed with this point of view (Report, 1914). True was especially supportive of federal support for agricultural education after he was assured such programs would not have experiment stations, such as the Congressional district schools, and that cooperative extension would operate separate from vocational education at land-grant universities. A. B. Graham, in charge of College Extension Work at The Ohio State University, also agreed that land-grant universities such as Ohio State were not in the business of training elementary agriculture teachers (Hearings, 1908).

With the evolutionary change that had occurred from normal school influence to land-grant influence, it was logical that agricultural education teacher educators would reach the status of their counterpart agricultural subject matter faculty. This status generally meant departmental establishment in colleges of agriculture at land-grant universities.

CONCLUSIONS AND/OR RECOMMENDATIONS

Land-grant universities were born during perhaps the greatest crisis the United States ever faced. The Civil War created great tragedy, but such a crisis also generates creative solutions to the problems faced by the country. This accomplishment is held in common with vocational legislation that started federal support for agricultural education. The most significant seemed to have come about during crisis situations such as a war or a depression. A good example is the Smith-Hughes Act passed during World War I.

It took many people to establish the land-grant system. Two such individuals stand above the others and deserve a great deal of credit. Jonathan Baldwin Turner had the creative genius to come up with the idea and concept of land-grant colleges. Justin Morrill had the political expertise to introduce and guide through Congress the enabling legislation. Both deserve a great deal of credit. In fact, it appears that the land-grant story is such a successful one that there is plenty of credit to go around.

Despite grave concerns over states' rights, the land-grant bill was passed and became the law for the entire country. Their unquestioned success has shown the value of federal leadership and the advantage of having uniform laws and finances creating an entire higher education system. It is doubtful that today, even the greatest of states' rights proponents would want to give up his or her state's land-grant university.

One could speculate that if land-grant universities had not been established, then agricultural education teachers would have been trained at normal schools. With a degree of political clout and a degree of logic, the early leaders decided that agricultural education teachers should be trained at the former institutions. The fundamental decision was one of placing agricultural education teachers closer to their agricultural subject matter specialists and not as close to the pedagogical specialists.

The entire agricultural education program has been influenced by this decision. It has caused closer ties to the other parts of the land-grant university. The agricultural education teacher has traditionally felt a kinship for agricultural experiment station research and the cooperative extension system. This same decision has probably created less close ties to the peer academic teacher who was trained at a normal school.

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AN ASSESSMENT OF CLIENTELE PREFERENCES FOR RECEIVING EXTENSION INFORMATION

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AN ASSESSMENT OF CLIENTELE PREFERENCES FOR RECEIVING EXTENSION INFORMATION

Delivery of Extension educational programs can take many forms. Altogether, at least seventy-two delivery methods can be used for delivery of information via non-formal educational means. Since Extension's educational programs are generally voluntary, successful programs must focus on analyzed needs of the publics in which Extension strives to serve, and the wide variety of choices for delivery of those programs must be considered as programs are implemented.

As Extension education has evolved, printed materials, meetings, and demonstrations have seen considerable use. During the early years of official Extension, the demonstration became the symbol of successful extension education, as depicted in the painting entitled "The County Agent" by Norman Rockwell that shows the Extension agent demonstrating the characteristics for selection of a 4-H calf (Rasmussen,1989).

Today, while many of the original program delivery methods used by Cooperative Extension are still used successfully, program delivery options and opportunities have changed as communications technologies have changed. Some technologies are now taken for granted as delivery methods, such as the telephone, radio, and television that were unavailable in earlier years of extension education. Today, video and audiocassettes are common place, and fax transmissions and computer networks are rapidly becoming key means for delivery of information. Indeed, satellite transmissions, and other hi-tech communications systems are becoming a normal part of our daily living. However, as with any delivery means, Extension educators should not only consider the availability of the delivery method, but also its utility for achieving educational objectives. Clientele preferences for receiving needed information must also be recognized, especially due to the voluntary nature of nonformal education and the client's freedom to engage in a learning opportunity or to disengage at will.

CLIENTELE PREFERENCES

During the past several years, some applied research has focused on the program delivery preferences of certain clientele as well as the effectiveness of specific methods in providing viable Extension programs. In an Iowa study, Martin and Omer (1988) reported that young farmers preferred that Extension agents use group oriented methods such as community meetings. The person to person means of office and telephone conferences were considered less important for receiving information. To obtain information about environmental issues, Bruening (1991) reported that Pennsylvania farmers most prefer field demonstrations. County and local meetings as well as magazines and printed material also ranked high.

Among North Carolina farmers, Richardson (1989) reported that the five methods most frequently used for receiving Extension information were (1) newsletters, (2) meetings, (3) farm visits(agent to farmers), (4) telephone, and (5) on-farm tests and demonstrations. In this study, traditional program delivery methods were found to be popular, but the farmer clientele indicated an interest in receiving information in the future via technologies that were considered newer at that time, such as computers and video tapes. There was a indicated decline in anticipated use of bulletins and magazine articles for receiving information in the future.

While North Carolina farmers expected to use some types of printed materials less, other printed media such as newsletters were popular both for present needs and for anticipated future use. Similar opinions were held in Oklahoma, as farmers there rated newsletters and fact sheets highest in preference for receiving Extension information for making decisions on alternative enterprises (Keating, 1990). For information on new and innovative farming practices, Idaho farmers preferred more interpersonal methods. These methods included demonstrations, tours, field trips, and group discussion. Mass media methods were the least preferred means for receiving this type of information (Gor, 1990).

When using printed materials such as newsletters and fact sheets, studies in Florida and Oklahoma confirmed that acceptance and use of these means of delivery can be significantly enhanced by targeting the audience and tailoring the message to that audience (Nehiley and William, 1980), (Reisbeck, 1980). Indeed, Clement (1994) in a North Carolina study, found that a targeted Extension audience of county government personnel indicated high preferences for printed, self-study type materials such as newsletters, newspapers, bulletin/pamphlet and leaflets or flyers.

These studies clearly show that clientele preferences do exist, and may be quite different depending upon the audience being served. Therefore, considering the great variability between groups, and indicated personal preferences, it is likely that no single delivery method is suitable for everyone. Yet, some trends exist that can be of value to the Extension agent in planning and implementing an educational program. For example, newsletters that are developed and directed toward a targeted audience appear quite popular. Meetings and other opportunities for discussion and interaction also appear to be popular among farm clientele. However, mass media methods were seldom identified as having high value for receiving specific information, except with an audience that could be classified as nontraditional, such as the county government personnel.

Such assessments can be highly valuable for providing educational programs that reach their intended audience(s) in a useful and efficient manner. In order to assess the program delivery preferences of specifically targeted Extension audiences in North Carolina, a study was conducted during the summer of 1992.

RESEARCH OBJECTIVES

The primary objective of the research project was to determine the preferences of targeted clientele for receiving specific Extension information.

A second objective was to determine if clientele perceived any program delivery methods becoming more important to them in the future.

A third objective was to determine if any program delivery methods were unfamiliar, but may be used by clientele for obtaining information if Extension would provide assistance in helping clientele become more familiar with the method(s).

Another objective was to determine if Extension clientele perceived any program delivery methods as becoming less important in the future.

In a later companion study, one additional objective was included. That objective was to determine if any methods were seen as out of date or obsolete by clientele. Those findings from that study are included in one section of this paper.

METHODOLOGY

Eleven North Carolina Cooperative Extension agents originating from eleven different counties in North Carolina representing areas from the mountains to the coast cooperated in this study. Each agent selected a subject matter area applicable to their county, and developed relevant program objectives to meet the needs of their local publics. The content of the subjects ranged from an urban waste management program to preconditioning beef cattle. The programs included subjects from the four major subject areas of agriculture, home economics, 4-H, and community development. As each educational objective was developed by each agent, they identified a specific audience in their county which was targeted for the educational program. Those audiences targeted were listed numerically. Seven persons were randomly selected from each agent's list and a personal interview of those selected was conducted by the agent. Each agent made their random selections by choosing numbers from a random number table. Altogether, seventy-seven clientele were interviewed, who represented a total of 994 people in the targeted audiences.

A questionnaire was developed and pretested, which was used by the agents during the personal interviews of clientele. In order to provide clientele a reference source, a listing of sixty-five methods were included. Responses were analyzed from each county and from all the counties combined. The sample was representative of the state geographically as all regions of the state were included.

A majority of the clientele had agricultural interests, but targeted audiences included community leaders; persons interested in watershed protection; urban home owners; school teachers involved in youth in-school enrichment programs; day care providers; as well as persons with interest in production agriculture programs.

FINDINGS

Perhaps one of the most interesting findings was that even though great diversity existed in the interests of the targeted audiences and the program focus for those audiences, their preferences of delivery methods were remarkably similar.

Preferred Methods

The information contained in Table 1 indicates preferences for mostly traditional delivery methods. The videocassette is the only "newer method" in which any meaningful acceptance appears to have occurred among these clientele groups.

TABLE 1: The Twenty-Two Most Preferred Delivery Methods Chosen by Extension Clientele as Among Their Five Most Preferred for Receiving Specific Information.

Method	Times Selected	% Clientele Selecting
Personal visit	36	46.8
Meeting	32	41.6
Newsletter	30	39.0
Method demonstration	26	33.8
Workshop	20	26.0
Videocassette	18	23.4
Bulletin/pamphlet	16	20.8
Field day	16	20.8
On-farm test	16	20.8
Seminar	12	15.6
Fact sheet	11	14.3
Lecture	10	13.0
Tour	9	11.7
Telephone	8	10.4
Leaflet/flyer	7	9.1
Group discussion	7	9.1
Letter	7	9.1
Office visit	7	9.1
Data analysis/results	6	7.8
Slide-tape	6	7.8
Newspaper	6	7.8
Specialty publication	6	7.8

Methods Expected to Become More Important

When asked to identify any methods that clientele expect to be important for receiving information in the future, many of the "newer methods" were identified. The information contained in Table 2 reflects these findings.

TABLE 2: Top Ten Methods Extension Clientele Expect to Become More Important For Receiving Information.

Method	N	% Clientele Selecting
Computer software	26	33.8
Computer network	22	28.6
Fax	19	24.7
Video cassette	12	15.6
Newsletter	10	13.0
Workshop	9	11.7
Satellite conferencing	8	10.4
On-farm test	8	10.4
Personal visit	7	9.1
Meeting	7	9.1

Unfamiliar Methods

When asked to identify delivery methods that are unfamiliar, but may be useful, the clientele selected many "newer methods". The information contained in Table 3 indicates some positive acceptance of methods that could be described as non-traditional.

TABLE 3: Top Ten Methods Identified as Unfamiliar but Willing to Use.

Method	N	% Clientele Selecting
Computer software	21	27.3
Computer network	13	16.9
Fax	8	10.4
Satellite conferencing	6	7.8
Teleconferencing	6	7.8
Home study kit	5	6.5
Teletip	5	6.5
Video cassette	5	6.5
Interactive video	4	5.2
Networking	4	5.2

Methods of Little Interest or Value

Identification of the methods that some clientele consider of little interest to them found a unique mix of higher technology methods along with others that many adults may consider more appropriate for children. The information contained in Table 4 reflects the interesting mix of methods.

TABLE 4: Top Ten Methods Clientele Consider of Little Interest or Value for Receiving Extension Information.

Method	N	% Clientele Selecting
Puppet	35	45.5
Satellite conferencing	32	41.6
Fax	26	33.8
Skit	25	32.5
Computer software	23	29.9
Computer network	18	23.4
Game	16	20.8
Role play	15	19.5
Church bulletin	14	18.2
Teleconferencing	13	16.9

Methods Clientele Never Expect To Use

When asked if there were any methods that they never expected to use, a similar mix of those in Table 4 was indicated. Apparently, similar attitudes existed among some clientele as to acceptance of newer technologies or their availabilities, or ideas relating to childish methods prevailed. The information contained in Table 5 reflects these findings.

TABLE 5: Top Ten Methods Identified as Ones They Never Expect to Use For Receiving Extension Information.

Method	N	% Clientele Selecting
Puppet	26	33.8
Fax	18	23.4
Satellite conferencing	17	22.1
Skit	15	19.5
Computer software	14	18.2
Church bulletin	13	16.9
Game	10	13.0
Cable television	10	13.0
Teleconferencing	9	11.7
Computer network	7	9.1

LATER STUDY

In a later study using the same methodology, conducted in the Fall of 1993, in addition to identifying the information presented in Tables 1 through 5, Extension clientele were also asked to identify methods they consider obsolete or out-of date. This study also reflected the thoughts of a varied clientele, and was obtained through interviews with 112 clientele, mostly in western North Carolina. These findings are shown in Table 6.

TABLE 6: Top Ten Methods Extension Clientele Consider Out-of-Date and Likely to Become Obsolete.

Method	N	% Clientele Selecting
Film strip	20	17.9
Slide-tape	16	14.3
Movie/film	8	7.1
Bulletin board	5	4.4
Puppet	5	4.4
Role play	5	4.4
Skit	5	4.4
Comics	4	3.6
Personal visit	4	3.6
Photograph	4	3.6

SUMMARY

Clientele preferences for receiving specifically targeted information is generally compatible with previous research findings, as personal visits, meetings, newsletters, demonstrations, and workshops ranked highest (Table 1). While these methods may be considered traditional, a clearly emerging newer technology is the video cassette, which was listed by nearly one-fourth of clientele as one of their five most preferred methods for receiving targeted information. When clientele were asked their reasons for selecting a method, those reasons focused almost exclusively on being able to use these methods for their subject and audience specificity. Considerable value was also placed on methods that allowed them opportunities to see and do, as well as to discuss the information.

For methods that clientele expect to become more important in the future, nearly all are newer and emerging technologies. However, even here, newsletters, workshops, and on-farm tests and demonstrations clearly are seen as relevant both presently and in the future by clientele (Table 2). Reasons given for selecting these methods related mostly to speed, ease, and efficiency.

In identifying methods that are unfamiliar, but willing for Extension to help them use, a great majority chosen were newer, high technology methods (Table 3).

When clientele were asked to name those methods of little interest or value, analysis of the date and their verbal reasons indicated either a general lack of availability or need for the newer methods, while other methods were seen uniquely applicable to certain audiences, but not for those interviewed (Table 4). Very similar expressions were given for identifying those methods that clientele never expect to use (Table 5).

The identification of numerous methods as obsolete reflects their knowledge and understanding of the viability of methods that can indeed be used for obtaining information. The top three methods identified in Table 6 were described as old technology, and that newer technologies such as videocassettes could be used more effectively than these older methods.

DISCUSSION

Many of the findings of this research are compatible with previous reports. Perhaps the diversity of the audiences and subjects gives validity to certain methods as especially useful for a broad range of audiences. Potentially most noteworthy is the strong interest that about one-third of the clientele have for high technology delivery methods such as computer technologies. Yet, nearly one-half of the audiences continue to prefer personalized interactive, hands-on methods. Thus, while continuing to use the more traditional, personalized methods, the interest in newer technologies indicates the need for Extension professionals to stay abreast of newer technologies and integrate these newer delivery methods into programming activities as appropriate.

However one must be cognizant that some clientele see the newer technologies as fast, efficient, and easy for obtaining information, while others see these new tools as unnecessary, unavailable, complex, or useless. Under these latter situations, where appropriate, Extension will need to educate their clients as to the benefits of delivery methods such as Fax. Under these circumstances, educational opportunities will need to be provided clientele on both the subject matter and the means of delivering the information.

Altogether, these findings demonstrate the need for continued efforts by Extension to provide educational opportunities through multiple delivery methods. However, those methods described as obsolete or childish can rapidly influence the motivation of the learner to continue in the educational program. Therefore, those methods which clientele do not like or have no use for could be disastrous to the success of an educational program if over used.

Perhaps the strongest message that clientele gave for preferring certain delivery methods was that the methods chosen provided them information that was both subject and audience specific, and provided them an opportunity to receive the information in an understandable and personally comfortable manner. Also, while some methods may be preferred, the relevance of the subject, and availability to them was shown to be an undergirding factor, regardless of the delivery method. Perhaps this factor is best demonstrated by the 49 different methods that were chosen as one of five preferred methods for receiving the needed information.

Successful implementation of Extension education programs in the future will require knowledge of the targeted audience, its characteristics, level of knowledge, and skillful selection and use of appropriate delivery methods for the targeted audience, as well as the subject matter to be presented.

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ASSESSMENT OF PROGRAM DELIVERY METHODS AND MEDIA CONCERNING CHEMICAL REGULATIONS IN AGRICULTURE AND LAWN AND GARDEN USES BY SELECTED COOPERATIVE EXTENSION PERSONNEL IN OKLAHOMA

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INTRODUCTION AND THEORETICAL FRAMEWORK

One of the most unique facets of the educational system in the United States is the Cooperative Extension Service. This is a unique system due to its structure as a cooperative federal, state, and local effort.

The methods of program implementation and information dissemination used by members of the Cooperative Extension Service are also distinguishing characteristics. The Cooperative Extension Service has a role as a diversified education organization that works closely with people from many segments of society. Cooperative Extension is a people-oriented service. From Human Environmental Sciences to the 4-H programs to Integrated Pest Management, people, and the education of people, are the main focus of the Cooperative Extension Service.

Cooperative Extension is the lay person's education arm of the land-grant university located within each state. As the university develops new technologies or new methods for using old technology, Extension provides the means for disseminating these technologies or methods. This dissemination of information must be done in terms and methods the lay person, who is in fact the end user, can understand and apply (Sanders, 1966).

Dissemination of information is attained through a variety of program delivery methods and media. The program audience will directly affect the delivery method or media used. An effective program delivery method for a 4-H club may not be an effective method for a pesticide-applicator program. The demographics of the group to which the program is being delivered are important factors in selecting a program delivery method or media.

The amount of time the Extension professional has to invest in development of different program delivery methods and media is extremely limited. With reductions in budgets and personnel come changes in and additions to the responsibilities of the Extension professional. Due to these changes, most Extension professionals have focused on the development of selected program delivery methods.

Review of Literature

Literature was reviewed in order to present information relating to the topic of this study. The review was organized into five major areas as follows: 1. Cooperative Extension's role in Adult Education; 2. Changing Behavior in Agriculture with Education; 3. Program Delivery Methods; 4. Program Delivery Media; 5. Basis for Chemical Use Education.

Cooperative Extension's Role in Adult Education

"The ultimate objective towards [sic] which Extension work is directed is more fruitful lives and better living for all people" (Sanders, 1966, p. 417).

The Cooperative Extension Service was created in 1914 by the Smith-Lever Act of Congress with the following purpose in mind.

> Central to extension programming are the needs of the people. It is an extension responsibility to translate new technology or indigenous experience into information that can be understood and applied by a large number of clients (Swanson, 1984, p. 110).

The Cooperative Extension Service works toward this purpose by utilizing employees at the county level. These employees are known as county agents. These agents receive support from specialists, both area and state, and from experts at land-grant universities. One primary responsibility of the agent is to initiate the translation of research-based information to the lay person or end user. According to Blauch (1969), it is the county agent who is responsible for bringing the service to the people for which the system was organized.

The audience of Extension is mainly adults. Gerling (1982) referred to Extension as "the single largest program of adult education and learning" (p. 1). Extension programs are directed at adults, according to Gerling. Even in the 4-H program, much of the effort is directed to assist adult volunteers.

According to Smith and Swisher (1989), the first step in any successful Extension program is to identify the audience. Once the audience is identified, the needs of the audience must be determined. Extension determines audience needs by asking the people who comprise the audience for input. This input of needs and priorities is usually done through the "Program Planning Committee" or the "County Advisory Council" (Pirtle, 1989). This helps the agents emphasize topics of interest to their audience.

The specific role of Extension in the field of agriculture is to promote change. Lionberger and Gwin referred to Extension personnel as 'change agents.' Their reasoning for this is the fact that these individuals' purpose is to help agriculturists apply new technology, newly discovered methods, and increase efficiency in production agriculture to benefit (Pirtle, 1989, p. 9).

Changing Behavior in Agriculture with Education

As stated earlier, the role of Extension is to promote change. This is not, however, an easy process. Several factors affect the process of change.

What influences people to change? This is one of the first items to consider. These influences vary from person to person and are commonly called variables. According to Lionberger and Gwin (1982)

> . . . variables include characteristics of individuals; the situation these individuals are in, both real and imagined; the kinds of help they get from

> outsiders; resources they have at their disposal; what their friends and relatives expect from them; what the friends and relatives will do if they make a change; the kind of education strategies they are exposed to; how they are treated; and the value they place on change (p. 5).

The "change agent" must consider whether family or individual goals will affect the process of change. In some cases, the goals of the individual will work to facilitate change. To meet these goals, the individual may need additional information, supplies, or services (Pirtle, 1989).

Another factor to be considered in the process of change is the Adoption Process itself. In this process, new technology or information is absorbed by the end user. There are five stages to the Adoption Process. They are as follows:

1. Awareness Stage — the individual is exposed to the innovation, but lacks complete information about it.
2. Interest Stage — the individual develops an interest in the innovation and seeks additional information.
3. Evaluation — the individual mentally applies the innovation to the present and anticipated future situations and then decides whether to try it.
4. Trial Stage — the individual uses the innovation on a trial basis to determine its effectiveness.
5. Adoption Stage — the individual decides whether to adopt or reject the innovation (Rogers, 1963).

Program Delivery Methods

"Researchers have found it useful to categorize the information sources utilized by farmers and homemakers as (1) personal, in which there is a face-to-face exchange between the communicator and the receiver, and (2) impersonal" (Rogers, 1963, p. 19).

According to Rogers (1963), impersonal information sources are most important in the awareness stage of the adoption process and personal sources are most important in the adoption and evaluation stages. The need for different types of information at different stages of adoption has clearly shown the need for different types of program delivery methods.

Individual contact program delivery methods have been widely utilized by the Extension Service. Swanson (1984) said:

> Individual contact methods are time consuming but its importance cannot be stressed enough, because it is through working individually with the clientele that the extension worker learns about the people of the area, how they think, what their needs are, and how they carry on their work (p. 130).

Group teaching methods have been used by Extension agents because they reach more total people (Swanson, 1984). Group methods appeared to be utilized by Extension agents because of the efficient way they use time and personnel.

Pirtle (1989) referenced the following types of methods used to accomplish the individual and group contact strategies: Farm and Home Visits, Office Visits, On-Farm Demonstration, Experiment Station Visits, Visits by University Specialists, Group Workshops, Tours or Field Trips, Seminars, Lecture, Panel Discussions, and Conferences.

Program Delivery Media

The demand for information from the Extension staff is tremendous. The Extension staff is not capable of providing all the needed information with an individual or group contact method. For this reason, mass media methods are used to reach large numbers of people (Swanson, 1984). Mass media teaching loses some intensity when compared with personal contact, but the sheer numbers of people reached and the cost efficiency of these mass media methods more than offsets this loss of intensity (Wilson and Gallup, 1955). Mass media may even serve to stimulate greater interest in the subject and prompt the end user to seek more information from the Extension personnel (Swanson, 1984). There are many different types and variations of mass media delivery methods available for use by the Extension Service including the following: Slide Presentations, Video Tapes, Satellite Teleconference, Pamphlets and Fact Sheets, Newsletters, and Radio/Television Programs.

Basis for Chemical Use Education

People have become very concerned about pesticides, how they have been used, and their potential damage to human health, wildlife, and the environment. Since the early 1970s, "state Cooperative Extension Systems have provided educational programming on the safe handling, use, and storage of pesticides" (Creswell, 1990, p. 1).

The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), as amended in 1972, authorized the Administrator of the United States Environmental Protection Agency to enter into cooperative agreements with states to:

> 1. Delegate the authority to cooperate in the enforcement of this Act, and to assist states in implementing cooperative enforcement programs.
> 2. Assist state agencies in developing and administering state programs for training and certification of pesticide applicators.
> 3. Enter into contracts with Federal or state agencies for the purpose of encouraging the training of certified pesticide applicators.
> 4. Utilize the services (in conjunction with the United States Secretary of Agriculture) of state Cooperative Extension Services, for informing farmers of accepted pesticide uses and other regulations (Public Law 92-516, 1972).

"The initial intent of this training and education program was to provide information on pesticides that would enable participants to apply and handle them correctly and safely" (Creswell, 1990, p. 2).

Since the amendment of FIFRA, many other acts regulating or restricting the use of chemicals in agriculture or lawn-care practices have been passed down from Congress to the states. Changes in existing regulations and the introduction of new regulations have only increased the need for effective educational programs about the proper handling, use, and storage of these chemicals.

Summary

Literature reviewed indicated that Extension education can stimulate changes in practices used by producers. Many factors may influence and contribute to changes in practices. These factors must be considered before any type of program can be developed.

The literature indicated that once the influencing factors had been identified, a program delivery method must be chosen that meets the needs of the audience to be served. These delivery methods can be individual or group methods. They may also involve use of a mass media tool.

The literature also indicated that the Federal Government, through legislation of chemical regulations, created a need for chemical use education.

Statement of the Problem

As the disseminator of research information, the role of the Extension professional is very important and has many different facets. The agent must be able to help the public understand and implement the research as it is passed down from the university. Where to locate the information, how to deliver it, and how to apply it, are three important pieces of the information dissemination puzzle. Location and application of the information are the easiest of these three tasks. Delivery of the information to the audience is not only the most difficult of these tasks, it is also the most important. Many Extension agents have a limited background in education as a discipline. Behavioral education experience is also limited with most agents. Gerling (1982) reported that only 28 percent of the Oklahoma Extension Agriculture agents had degrees in Agricultural Education. Subject matter training and in-service workshops have not successfully determined the most effective delivery method for each audience.

One of the most controversial and most demanding areas of need for education has been in the area of chemical usage. The public has demanded that local, state, and federal governmental agencies enact more stringent restrictions and regulations on the use of chemicals in agriculture and lawn and garden applications.

> Agricultural officials and state legislators have been concerned that farmers, although certified (in pesticide application), have received inadequate training relative to the use of agricultural chemicals listed as being restricted by the United States Environmental Protection Agency (Creswell, 1990, p. 2).

As regulations and restrictions of chemical usage are enacted, the users' need for education about alternative practices, chemical or natural, increases. The Cooperative

Extension Service is, by definition, the public's main source of education about these alternative practices.

Some research has evaluated program delivery methods and media used by Extension professionals. That research, however, has been limited to the audience's perceptions of the program delivery methods and media. In a 1989 study conducted in Washington County, Oklahoma, Pirtle examined audiences' perceptions of the effectiveness of Extension program delivery methods and media. No studies were found that had been done in Oklahoma to assess the Extension personnel's perception of the effectiveness of these same methods and media. While it is important to know which methods and media the audience find most effective, the Extension personnel's perceptions of effectiveness will have a more direct influence on the method or media selected for presenting programs and disseminating information. The selection of the proper program delivery method or media greatly influences the effectiveness of Extension programs.

This study examined the methods and media currently being used by selected Oklahoma Cooperative Extension personnel, and the effectiveness and frequency of use of these methods and media as perceived by the selected Extension personnel.

PURPOSES AND OBJECTIVES

The purpose of the study was to describe and assess the program delivery methods and media used by Cooperative Extension personnel concerning topics relative to regulations in agricultural and lawn and garden uses of chemicals. The study also examined the Extension personnel's perceptions of the effectiveness and frequency of use of these methods and media.

The objectives of the study were:

1. To identify and describe selected demographic characteristics of Cooperative Extension personnel surveyed.
2. To identify and describe selected program delivery methods and media used by Cooperative Extension personnel concerning agricultural and lawn and garden chemical regulations.
3. To examine the Cooperative Extension personnel's perceptions of the effectiveness of the selected methods and media.
4. To determine the frequency of use of the selected methods and media.

METHODS AND PROCEDURES

Scope and Population of the Study

The scope of this study was all Cooperative Extension Service Agriculture, Horticulture, Agronomy, Entomology, Plant Pathology, and Integrated Pest Management agents in the state of Oklahoma.

The population for this study included 91 Cooperative Extension Agriculture, Agronomy, Entomology, Plant Pathology, Horticulture, and Integrated Pest Management agents from the state of Oklahoma. This included county agents, and area and state specialists. These individuals were located on mail lists in the Oklahoma Cooperative Extension office as of July 1, 1994.

A total of 58 questionnaires were returned, a 62 percent response rate.

Instrument and Data Collection

The survey instrument was limited to a questionnaire. The questionnaire asked the Extension personnel to rate the effectiveness of Extension program delivery methods on a 5-point Likert-type scale with 1 being Not Effective; 2, Of Little Effectiveness; 3, Somewhat Effective; 4, Effective; and 5, Very Effective. The instrument also addressed the frequency with which each method was used. A 5-point Likert-type scale was again used with 1 being Not Used; 2, Rarely Used; 3, Sometimes Used; 4, Frequently Used; and 5, Heavily Used. Information was also requested regarding the effectiveness and frequency of use of program delivery media. The program delivery media were rated on the same 5-point Likert-type scales as the delivery methods.

The data were collected by means of questionnaires delivered in person to 26 agents at the Oklahoma Extension Agriculture Agents conference in Stillwater, Oklahoma. Any Agriculture agents who were not in attendance, as well as the remaining members of the population, were mailed the questionnaire, along with a self- addressed, stamped, return envelope.

Data Analysis

The analysis of data was completed by calculating frequency distributions, percentages, mean scores, and standard deviations. The mean score for each delivery method and medium was calculated and the methods and media were rated using the calculated mean to determine the appropriate category of effectiveness and frequency of use.

FINDINGS OF THE STUDY

As previously stated, the major focus of this study was to determine the perceptions of Cooperative Extension personnel regarding program delivery methods and media used for delivery of information concerning chemical regulations in agriculture and lawn and garden usages. The study also examined the frequency of use of these methods and media.

Summary of Mean Responses Concerning the Effectiveness and Frequency of Selected Program Delivery Methods.

Data in Table 1 are a summary of mean responses and ratings of the perceived effectiveness and frequency of use of selected program delivery methods. The Agriculture group was the only group to rate Individual Contact as the best method and was the only group to rate any method Very Effective. Entomology and Plant Science specialists found Farm Visits to be the best method and both rated the method Effective.

The least effective methods were Panel Discussions and Group Lectures. Plant Science and Entomology specialists both rated Panel Discussions as Somewhat Effective and it had the lowest mean rating of any method in both groups. Agriculture agents rated Group Lectures as Somewhat Effective with the lowest mean of any method they evaluated.

Individual contact had the highest overall mean (4.43) and an Effective rating. Panel Discussions had the lowest overall mean (2.81) and were rate Somewhat Effective.

Individual contact was the method most used by all three groups. Agriculture agents rated it Heavily Used and Plant Science and Entomology specialists rated it Frequently Used. Panel Discussions were given the lowest rating by mean in each of the three groups. Agriculture agents and Plant Science specialists both rated it Rarely Used, while the Entomology specialists rated it Sometimes Used.

Individual Contact had the highest overall mean (4.48) and a Frequently Used rating. Panel Discussions had the lowest overall mean (2.36) and a Rarely Used rating.

Summary of Mean Responses Concerning the Effectiveness and Frequency of Selected Program Delivery Media.

Data in Table 2 summarizes the mean responses and ratings for the effectiveness and frequency of use of selected program delivery media.

The Agriculture Agents and the Plant Science specialists both gave their highest rating (by mean) to On-Farm Demonstration. This was an Effective rating. The Entomology specialists rated Slide Presentations and Pamphlets and Fact Sheets the highest by mean. Both were rated Effective.

Plant Science specialists rated Computers and Exhibits and Displays the lowest by mean. Both were rated Somewhat Effective. Entomology specialists also rated Computers the lowest by mean. It was given a Somewhat Effective rating. Satellite Teleconference was rated the lowest by the Agriculture agents. It was rated Of Little Effectiveness.

On-Farm Demonstration had the highest overall mean (3.89) and a rating of Effective. Satellite Teleconference had the lowest overall mean (2.54) and a Somewhat Effective rating.

Pamphlets and Fact Sheets were rated the most used method by the Agriculture agents (Frequently Used). The Entomology specialists gave both Pamphlets and Fact Sheets and Slide Presentations the same ratings (Heavily Used, 4.50). The Plant Science specialists gave their highest rating to Slide Presentations (Frequently Used).

Computers were rated the least used media by the Agriculture agents. Entomology

TABLE 1
OVERALL EFFECTIVENESS AND FREQUENCY OF USE OF SELECTED PROGRAM DELIVERY METHODS

	EFFECTIVENESS		FREQEUNCY	
METHOD	Mean	Rating	Mean	Rating
Individual Contact	4.43	Effective	4.48	Frequently Used
Farm Visits	4.42	Effective	4.02	Frequently Used
Office Visits	4.27	Effective	3.67	Frequently Used
Visits by University Specialists	3.95	Effective	3.29	Sometimes Used
On-Farm Demonstrations	3.89	Effective	3.28	Sometimes Used
Tours/Field Trips	3.65	Effective	3.24	Sometimes Used
Group Workshops	3.50	Effective	3.22	Sometimes Used
Groups Seminars	3.34	Somewhat Effective	3.14	Sometimes Used
Visits to Experiment Stations	3.20	Somewhat Effective	3.12	Sometimes Used
Conferences	3.16	Somewhat Effective	2.89	Sometimes Used
Groups Lectures	3.00	Somewhat Effective	2.64	Sometimes Used
Panel Discussions	2.81	Somewhat Effective	2.36	Rarely Used

TABLE 2
OVERALL EFFECTIVENESS AND FREQUENCY OF USE OF SELECTED PROGRAM DELIVERY MEDIA

	EFFECTIVENESS		FREQEUNCY	
MEDIA	Mean	Rating	Mean	Rating
On-Farm Demonstration	3.89	Effective	4.28	Frequently Used
Pamphlets and Fact Sheets	3.88	Effective	3.98	Frequently Used
Newsletters	3.77	Effective	3.72	Frequently Used
Slide Presentation	3.65	Effective	3.29	Sometimes Used
Video	3.36	Somewhat Effective	3.26	Sometimes Used
Exhibits and Displays	3.15	Somewhat Effective	2.90	Sometimes Used
Lecture	3.14	Somewhat Effective	2.84	Sometimes Used
Radio/TV Programs	3.11	Somewhat Effective	2.70	Sometimes Used
Computers	2.55	Somewhat Effective	2.28	Rarely Used
Satellite Teleconference	2.54	Somewhat Effective	2.26	Rarely Used

specialists gave their lowest rating to Satellite Teleconference. Video was the media used least by the Plant Science specialists. All three methods were rated as Rarely Used.

Pamphlets and Fact Sheets had the highest overall mean (4.28) and a Frequently Used rating. Satellite Teleconference had the lowest overall mean (2.26) and a Rarely Used rating.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Interpretation of the findings of this study prompted the following conclusions:

1. The most effective forms of program delivery methods and media involved personal contact between the agent and the client.

2. The more effective a delivery media or method was perceived to be, the more frequently it was used by Extension agents.

3. The principle difficulty in delivering information about chemical regulations to the clients was the nature of the information itself. The information is dry, boring, difficult to understand, and clientele apathy exists toward the subject.

4. Understanding the information by the Cooperative Extension personnel before presentation to the clientele is essential for a successful program.

5. There was little discernable difference between the three groups' perceptions of effectiveness or frequency of use of the selected program delivery methods and media.

Recommendations

The following recommendations were based on the findings of this study and the conclusions that were reached:

1. That the findings of this study be communicated to the Cooperative Extension Service of the State of Oklahoma, department heads and faculty in Agronomy, Horticulture, Plant Pathology, and Entomology at Oklahoma State University so that the results of this study may serve as a guide for development and further use of selected program delivery methods and media.

2. That the Oklahoma Cooperative Extension Service develop a training program to better educate Extension personnel about chemical regulations for agriculture and lawn and garden usages.

3. That the Oklahoma Cooperative Extension Service develop a method of translating chemical regulations and information into a format which is easy to understand for both the Extension personnel and the clientele.

4. That Extension personnel be made aware of difficulties other agents encounter when presenting programs regarding chemical regulations.

Recommendations for Further Study

Further study which could provide helpful insight into related aspects of this research include:

1. Determine the perception of the Extension clients and compare them with the perceptions of the Extension personnel as to the effectiveness of program delivery methods and media concerning chemical regulations.

2. Determine what changes need to be made in the development of the wording of chemical regulations so that the regulations would be easier for all parties to understand.

3. Determine the attitudes of Cooperative Extension personnel toward chemical regulations.

4. Determine the attitudes of Cooperative Extension clientele toward chemical regulations.

5. Determine what influences the attitudes of Extension personnel and clients toward chemical regulations.

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A DESCRIPTION OF GREENHOUSE TOMATO GROWERS AND THEIR USE OF AN EXTENSION-RECOMMENDED INTEGRATED PEST MANAGEMENT PROGRAM

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A DESCRIPTION OF GREENHOUSE TOMATO GROWERS AND THEIR USE OF AN EXTENSION-RECOMMENDED INTEGRATED PEST MANAGEMENT PROGRAM

INTRODUCTION AND THEORETICAL FRAMEWORK

The production of greenhouse tomatoes in Mississippi is one of the most rapidly growing industries in the state. In the past five years, the number of growers has increased from about 15 to over 90. Mississippi currently ranks eighth in the U.S. in production of this crop in terms of acreage under plastic (Snyder, 1993a).

Although market demand for greenhouse tomatoes is expected to continue, a supply of high quality fruit required by expanding markets is dependent on the ability of growers to avoid pest problems. Diseases and insects are constant threats to production of the crop in Mississippi as well as other areas (Killebrew, 1994). Growers who successfully combat greenhouse tomato pests commonly rely on integrated pest management (IPM). IPM uses a combination of biological, cultural, and chemical techniques, with a two-pronged focus: adoption of preventive measures to avoid diseases that are likely to attack the crop, and monitoring to allow early detection of insects and diseases. This early detection allows avoidance of strict reliance on pesticides (Harris, Killebrew, & Willcutt, 1994).

The Cooperative Extension service is an educational agency designed to work cooperatively among the federal, state, and local governments toward the effective achievement of its mission. The mission of the Cooperative Extension Service, as stated by the Joint USDA-NASULGC Committee on the future Cooperative Extension Service (1983), is to create better agriculture, better home, and better communities by disseminating and encouraging the application of research-oriented knowledge to individuals, families, and community.

Information about greenhouse tomato grower profiles in Mississippi are not readily available. This study was designed to explore some specific information from greenhouse tomato growers in Mississippi, including a demographics profile (gender, ethnic group, age, marital status, educational level, area of specialization in college, employment status, and contact with extension agents, extension specialists, and university research personnel), enterprise profile (type of business, type of business structure, association with large company, year when started using IPM, and yearly gross income within last three years), and program profile (sources of IPM information which provided by Extension, and IPM approaches used).

History of IPM

The earliest record of IPM as a formal agricultural practice dates from the 1920's and 1930's. Isley initiated modern IPM by using principles of scouting, economic thresholds, and trap crops, along with insecticides, to control boll weevil in cotton. Isley also studied the biology and ecology of the boll weevil and used this information in a IPM system (Blair, 1982). IPM did not gain prominence until the late 1960's in spite of Isley's innovative program. There are several reasons for this lack of progress. Previous to this time and there was little problem with pest resistance to pesticides when environmental quality was not a major concern. They were inexpensive, easily stored, readily available, and extremely effective against their targets when synthetic pesticides were introduced in the 1940's. They often in fact were looked upon as complete cures for pest problems. Heavy dependence on chemicals, however, resulted in numerous problems, including the development resistant pests; the death of non-target organisms, including natural enemies of the pest, the resurgence of pest populations; the emergence of secondary pests, crop and environmental contamination; and detrimental effects on human health. This led to serious negative impacts on farm profits (Croft & McGroarty, 1978; Lange & Kishiyama, 1978). Though initially little recognizable need for IPM programs existed, the situation soon changed. IPM programs are now prevalent in many areas of the country and in the production of many commodities (USEPA, 1980).

Developing the IPM Program

An operational concept of IPM was developed for the Science and Education Administration of the USDA to facilitate the organization of state IPM programs (Allen & Bath, 1980). Pest management programs were described as a series of 7 components:

1. Basic Research - Basic Research investigates the biology, ecology, and taxonomy of pests; life cycles, population dynamics, and epidemiology are examples.

2. Control Components Research - Control Components Research develops as many pest control techniques as possible.

3. IPM Systems Research Level I - IPM Systems Research Level I develops management systems that integrate two or more control techniques to manage one or more species of the same type, such as insects.

4. IPM Systems Research Level II - IPM Systems Research Level II integrates research from two or more pest groupings, such as plant pathogens and insects.

5. Extension Level I - Extension Level I delivers information for managing pests of one type, such as insects or weeds, in one or more commodities.

6. Extension Level II - Extension Level II delivers information for managing pests belonging to two or more groupings, such as disease and insects, in one or more commodities.

7. Higher Education - Higher Education develops curricula and courses to provide interdisciplinary training. Knowledge and information from the base of an IPM program as these seven components illustrate.

Operational Underpinnings of an IPM Program

There are two operational underpinnings in most IPM programs: the use of thresholds and field monitoring systems.

Threshold. An idea which is crucial to many IPM decisions is the concept of using thresholds for decision making. One type of threshold is economic injury level. Economic injury levels are first established and then used as a basis for determining when a management component, such as a pesticide, is needed. Headley (1972) defined the economic injury level as the pest populations that produces an incremental damage equal to the cost of preventing the damage.

Monitoring. Another essential part of an IPM program is the development of reliable monitoring techniques. Monitoring activities result in the collection of information on pest and beneficial species population density, weather conditions, plant phenology, relevant management practices, soil type, etc. Monitoring involves taking samples at the correct time, as well as using the correct sampling method. Successful monitoring depends on a clear knowledge of the ecology and biology of the pest (Headley, 1972).

Management Practices of IPM

There are many practices available for managing pests in agricultural situations. These have generally been separated into chemical and non-chemical practices. Chemical practices involve the use of pesticides. Non-chemical practices involve pheromone techniques, biological controls, cultural controls, mechanical controls, host plant resistance, and pathogen genetic manipulation (Lyons & Ferris 1985; Virginia Cooperative Extension Service, 1987; Harris, Killebrew, & Willcutt, 1994).

Delivery of IPM Information

IPM delivery is an information-intense system requiring both background information to generate an understanding of the system and recent information that announces pending events.

Extension educational information has traditionally been delivered to the grower or homeowner through various oral and written reports. Farm visits, telephone calls, newsletters, bulletins, and feature articles in newspapers have all been means of reaching growers. Many states have developed scouting manuals that include color photos of pests, weeds, and the manifestations of diseases of a given crop, along with descriptions of the correct scouting procedures and possible control practices for each. IPM, however, in contrast to the calendar spray approach, needs timely field level data about population levels of pests, predators, and parasites, and information regarding environmental conditions. If an economically and environmentally optimum decision is to be made, information on alternative pest control strategies is also necessary (Croft, Howes, & Welch, 1976; Harris, Killebrew; & Willcutt, 1994). There must be a rapid transfer of information to the farmer or other decision maker when an analysis is completed. In the past, extension has responded to these needs and constraints by using computer delivery systems such as SCAMP at Cornell University, PMEX at Michigan State University, and IMPACT at the University of California to ensure rapid information transfer (Zalom, 1983; Sarette, Tette, & Barnard, 1981; Croft, Howes, & Welch, 1976).

Both the characteristics of users and their informational needs were considered in the development of these computer delivery systems. For example, it is possible to get information on fruit without going through reports for other commodities. These systems are flexible enough to fit different types of users, such as extension personnel, research specialists, field technicians, and growers. The systems require little technical knowledge so that users with only a minimal amount of computer experience can assess the information (Sarette, Tette, & Barnard, 1981).

The role of agricultural and extension education in helping with this study are contributed by several authors. Brown (1992) recommended that agricultural educators not shyly approach their agricultural teaching, research, and extension counterparts and try to become accepted as part of the family, but that they exert active leadership on behalf of the entire agricultural research and education system. Fuller (1990) said that "... our emerging market niche in higher education is as behavioral scientists who focus on the educational issues related to economic development of the food, fiber, agriculture, and natural resources systems within our nation, as behavioral scientists, we have a capacity to expand beyond the roles traditionally assigned by our institutions" (p.3).

Brown (1992) further encouraged agricultural educators to take the initiative in forming alliances with our peers in other disciplines and with the private sector in agricultural and natural resources. Additionally, this study is supported by the recommendation of Buriak and Shinn (1991) that one major area of agricultural education research be teaching/program evaluation, specifically program impacts, program change, communication methods, and program evaluation and accreditation.

PURPOSE AND OBJECTIVES

In Mississippi, extension personnel must know the needs of greenhouse tomato growers in order to provide effective programming. The purpose of this study, therefore, was to determine the level of implementation of the extension-recommended IPM approach by greenhouse tomato growers in Mississippi. To accomplish this purpose, the researchers developed the following objectives:

1. To provide a demographic profile of greenhouse tomato growers in Mississippi;

2. To determine the success with which greenhouse tomato growers are implementing IPM programs; and

3. To determine where growers obtain information about IPM.

METHODS AND PROCEDURES

This study combined quantitative and qualitative methods and on-site and survey methods. Quantitative survey methods were used to describe the growers on selected demographic and production variables and to determine how they used the cooperative extension service in their implementation of IPM practices. Qualitative and quantitative methods were used to determine the effectiveness of IPM approaches by selected growers.

Population/Sampling

The population for the study consisted of all greenhouse tomato growers in Mississippi (N = 87). A simple random sample of 45 growers was drawn from the population for the survey phase of the study. Four greenhouses were selected for the on-site, qualitative part of the study.

Instrumentation

A questionnaire was developed based on the national evaluation of extension's IPM programs conducted in 1987 (Rajotte, Kazmierczak, Norton, Lambur, & Allen, 1987). Content validity was established by a panel of experts from agricultural education, plant pathology, horticulture, entomology, and the cooperative extension service.

Data Collection

For the survey phase, a letter stating the objectives of the study, along with a stamped, return-addressed envelope, and the questionnaire was mailed to 45 growers on April 12, 1994. Follow-up phone calls were made beginning 14 days after the initial mailing. Nine people were eliminated from the sample because they indicated they were no longer in business. Of the remaining 36 people in the sample, 27 responded for a response rate of 75%.

The on-site phase included a combination of qualitative and quantitative techniques: direct observation of the growing condition of tomatoes in the greenhouse (documented with photographs), face to face interviews of growers, and collecting of tissue samples from the plants to determine the presence or absence of important nutrients via tissue analysis.

FINDINGS

The majority of growers were male (85.19%) and all were white. Around 63% of the growers were over 40 years old. Most growers were married (88.89%) and had graduated from high school (62.96%), but not college. Only 29.6% of the growers had a college degree. Over half of the growers indicated that growing tomatoes was their full time occupation (55.56%). The majority of growers (74%) communicated with extension personnel once a month or less frequently (see Table 1).

Twenty-six (96.3%) growers indicated that they ran a completely independent private type of business. Most (81.48%) growers had a sole proprietorship type of business structure. Two respondents (7.41%) had partnership type of business structure; while one (3.70%) respondent had a corporation. Only one (3.70%) respondent indicated some other type of business structure than those designated. Only one grower indicated a relationship with a large company.

The 27 growers who responded indicated that they owned a total of 58 greenhouses, an average of 2.15 greenhouses per respondent. The highest number of greenhouses owned was 8 (one respondent), and the most frequently reported number of greenhouses owned was one (twelve respondents).

Most (77.8%) of the respondents indicated that they began using IPM approaches after 1989. Three (11.11%) of the respondents started using IPM practices between 1980 and 1989 and only 1 (3.70%) respondent started using IPM practices before 1980.

Fourteen (51.85%) respondents had less than $20,000 yearly gross income, including seven full-time growers and seven part time growers. Seven respondents (25.93%) indicated a gross income between $20,000 to $49,999; while only 1 (3.70) of the respondents reported a gross income over $49,999. Five (20.83%) of the growers did not respond to this question. During telephone interviews, growers indicated a frustration because of the lack of profits generated by their operations. The primary perceived problem was marketing and market limitations. Table 2 contains a summary of yearly gross income responses.

The most commonly used sources of IPM information were growers' own research and own experience (Mean = 3.58), extension printouts (bulletins, manuals, and handbooks) (Mean = 3.56), and telephone visits with extension agent or extension specialist (Mean = 3.52). Table 3 contains a summary of reported sources of IPM information.

Growers were also asked to identify statements which described their approach to using IPM. The most commonly reported use of IPM was "a combination of

Table 1. Distribution of Respondents by Demographics (N =27).

Variable	Category	Frequency	Percent
Gender	Male	23	85.19
	Female	4	14.81
Ethnic Group	Asian	0	0.00
	Black	0	0.00
	White	27	100.00
	Hispanic	0	0.00
Age	Under 20	0	0.00
	20 - 30	2	7.41
	31 - 40	2	29.63
	41 - 50	4	14.81
	Above 50	13	48.15
Marital Status	Single	3	11.11
	Married	24	88.89
	Divorced	0	0.00
Educational Level	High school	17	62.96
	Bachelor's degree	7	25.93
	Master's degree	1	3.70
	Other	2	7.41
Area of Specialization in College (n = 10)	Pest management	0	0.00
	Liberal arts	0	0.00
	General science	2	20.00
	General agriculture	3	30.00
	Pest related area	0	0.00
	Other	5	50.00
Employment Status	Full-time	15	55.56
	Part-time	11	40.74
Contact with Extension Agents, Extension Specialists, and University Research Personnel	Once a day	0	0.00
	Once a week	5	18.52
	Once every two weeks	2	7.41
	Once a month	11	40.74
	Less than once a month	9	33.33

biological and genetic (primarily disease-resistant) varieties, and chemical control methods that are not as likely to adversely affect the environment and humans)" (Mean = 3.78). The responses to this question are summarized in Table 4.

On-site visual observations revealed that *Botrytis* gray mold and whiteflies were common pests. Of the four locations studied on-site, three locations had both *Botrytis* gray mold and whiteflies. Tissue analysis revealed a zinc deficiency and a

Table 2. Yearly Gross Income (Three-Year Average) (N=26).

	Full-Time Growers		Part-Time Growers	
Income	Frequency	Percent	Frequency	Percent
Less than $20,000	7	63.64	7	46.67
$20,000 to $49,999	2	18.18	5	33.33
More than $49,000	0	0.00	1	6.67
No Response	2	18.18	2	13.33

Table 3. Sources of IPM Information Used by Greenhouse Tomato Growers (N=27).

Source	Mean	S.D.
Your own research and own experience	3.58	1.35
Extension bulletins, manuals, and handbooks	3.56	1.29
Telephone visits with extension agent, specialist, other	3.52	1.48
Information obtained from other growers	2.88	1.13
Greenhouse visits with extension agent, specialist, other	2.80	1.53
Extension specialist	2.72	1.57
Newsletters, newspaper and trade magazines	2.56	1.50
Extension sponsored workshops	2.48	1.29
Extension sponsored production meetings	2.44	1.36
Professional and general farm journals	1.84	0.99
Consultants	1.68	1.18
Commodity and agricultural industry meetings	1.64	0.91
Agribusiness dealers	1.64	1.22
Extension radio program	1.48	1.12
Chemical or farm/horticultural supply sponsored meetings	1.28	0.61
Extension television/ videotapes	1.24	0.44
Extension computer networks	1.08	0.28

Note. Scale: 1 = seldom used, 2 = infrequently used, 3 = sometimes used, 4 = frequently used, 5 = very frequently used.

Table 4. IPM Approaches Used by Greenhouse Tomato Growers (N=27).

Approach	Mean	S.D.
Use of a combination of biological, genetic (primarily disease-resistant varieties), and chemical control methods that are not as likely to adversely affect the environment and humans)	3.78	1.53
Use of chemical treatments after scouting has indicated that enough insects or diseases are present to cause economic damage to the crop; primary reliance on chemical treatments	3.35	1.29
Use chemical treatments routinely on timed schedule regardless of insect/ disease pressure in the greenhouse	1.93	1.36

Note. Scale: 1 = seldom used, 2 = infrequently used, 3 = sometimes used, 4 = frequently used, 5 = very frequently used.

slight potassium deficiency in plants in one location. In another location, tissue analysis revealed slight nitrogen and phosphate deficiencies. Both of these locations were also in the group of three that had both *Botrytis* gray mold and whiteflies.

CONCLUSIONS AND RECOMMENDATIONS

Growers responding to this study relied on traditional sources of information such as extension bulletins, manuals and handbooks, and direct contact with individuals and groups in meetings and workshops. If extension wants to maintain and improve information delivery to this group, it would be best to maintain traditional delivery methods while introducing computer networks and other electronic systems for this audience (Rajotte, Kazmierczak, Norton, Lambur & Allen, 1987).

Growers should take full advantage of publications already available through their county agents and specialists. In Mississippi, these include guides on pest management (Harris, et al., 1994), production of greenhouse tomatoes (Snyder, 1992), environmental control of greenhouses (Snyder, 1993b), and fertilization management (Snyder, 1993c).

Some growers were using improper IPM approaches. An ideal IPM program should include a combination of biological controls, genetically-enhanced varieties, and chemical controls instead of a primary reliance on chemical treatments (Killebrew, 1994). Proper use of IPM both controls the pests and diseases and protects the environment and humans. Extension personnel should immediately deliver correct and efficient information for growers so they can implement IPM approaches correctly.

Growers need to develop marketing skills so they can make their operations more profitable. They must be able to secure stable, ongoing markets to provide a consistent income so long range plans can be made. Extension personnel could meet this need through workshops and informal classes on market analysis and marketing techniques.

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